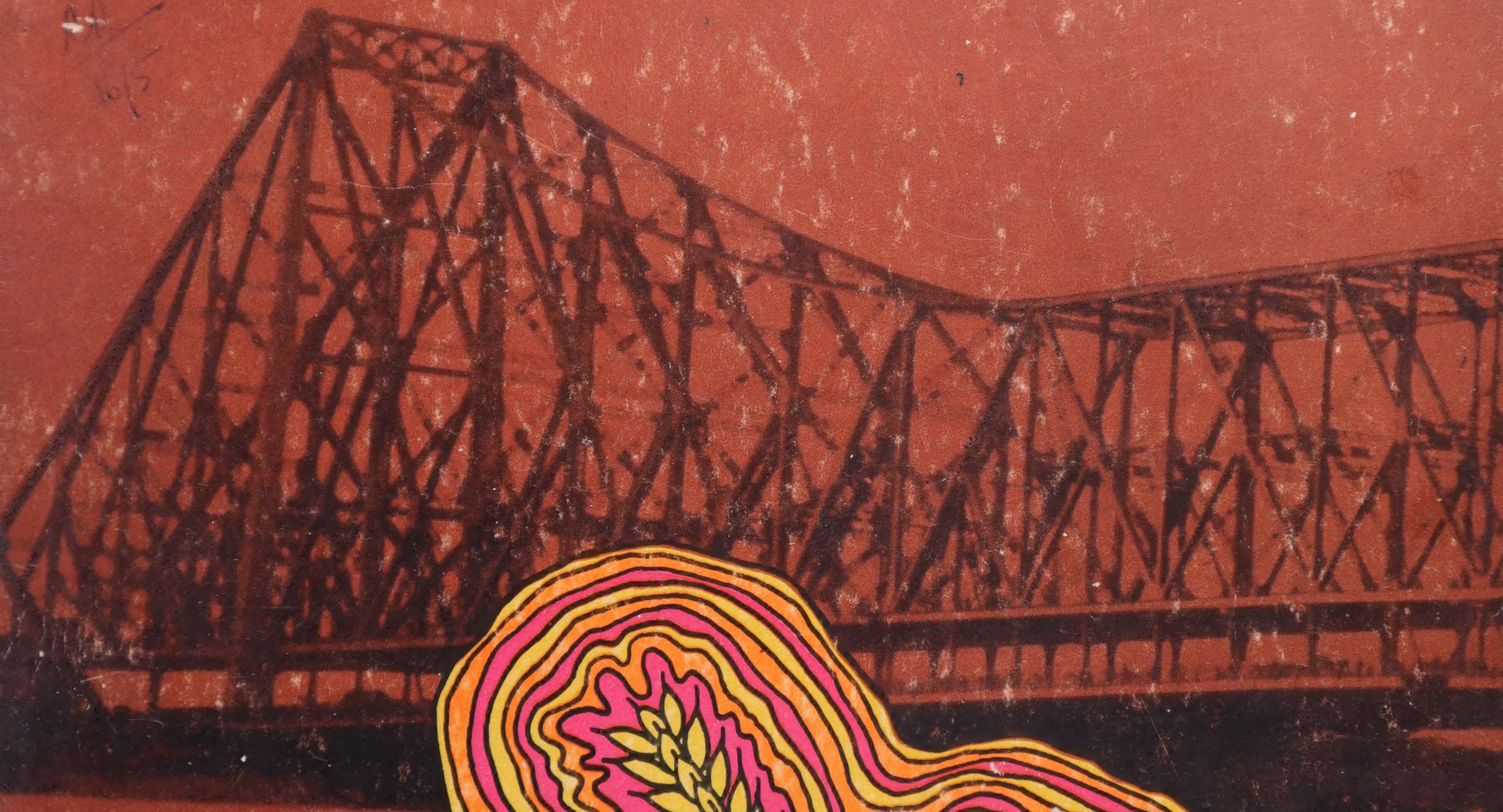
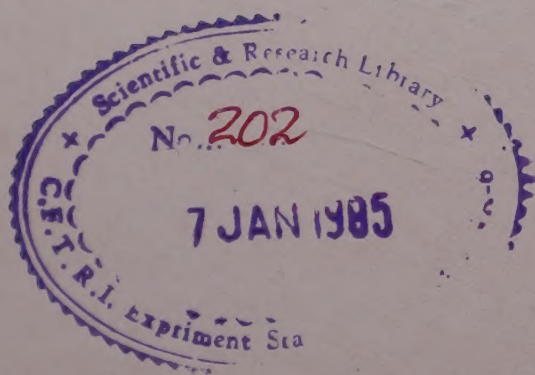




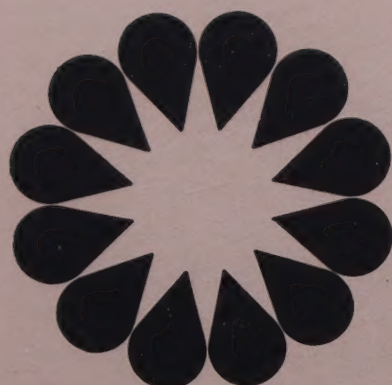
Calcutta Workshop:
Nutritious Foods for Everybody
Nov. 1972



202



Nutritious Foods for Everybody



Report of the Calcutta Workshop

A marketing
workshop based
on a food habits
survey of
Calcutta city
carried out by
Hindustan Thompson
Associates Ltd.,
Calcutta

Conducted by the
**Protein Foods
Association of India**

at the
Park Hotel, Calcutta
on November 20-21, 1972

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Assistance given by the Food & Nutrition Division
of USAID in the conduct of the Calcutta workshop is
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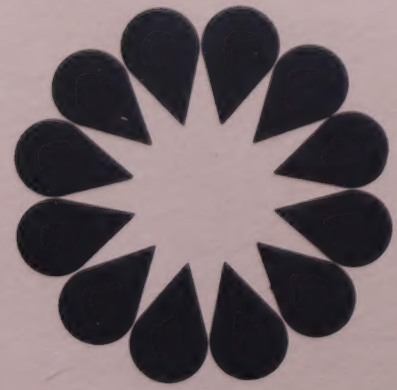
Compiled by Dr. K. T. Achaya,

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Chapter I:

Genesis and Strategy of the Workshop

Genesis and Strategy of the Workshop

Malnutrition and under-nutrition, particularly among the lower-income segments of the Indian population, are well-recognised problems. Indeed over the last few years nutrition has engaged the attention, not only of medical men, scientists, public health workers and social scientists as in the past, but of economists and development planners. This has been brought about by recent discoveries of the effects of malnutrition in body and brain development combined with some insight into its very complex causes. In turn the hypothesis has been developed that a well-nourished nation is an essential precondition for economic development and social equality, replacing the earlier complacent belief that the process of economic development will automatically bring about an improvement in a nation's health. Nutrition has indeed become a milestone in the path of national development.

While the general condition is known, malnourishment presents *specific factors* in various parts of our country, with its diverse food habits, food ingredients, attitudes and social custom. A solution appropriate to one part of the country may be applicable only in part to another. In December 1969, the Protein Foods Association of India held in Delhi a food marketing workshop based on prior diet surveys which it had carried out in the states of Maharashtra and Gujarat. While some of the concepts developed at the Delhi Workshop

were of a general character applicable elsewhere, the product profiles which emerged were specific to the regions being looked at. The widespread national feeding programmes point up the same situation: foods acceptable in one area may well not be appropriate in another.

A *comprehensive food habits survey* was carried out during 1969-70 in the Calcutta metropolitan area by Hindustan Thompson Associates Ltd., Calcutta. This covered a careful investigation of 2500 families, and provided a vast mass of data on food habits, family budgets, buying patterns, the nutritional levels of various age-groups of the population and the attitudes of housewives towards foods. This data was generously placed at the disposal of the Protein Foods Association of India since the latter organisation was believed to be equipped to translate such information into practical nutritive terms by way of a marketing workshop. This belief was based on the objectives and past record of the *Protein Foods Association of India*. It had earlier organised, as mentioned, a similar marketing workshop in Delhi which had brought together on a common platform science, industry and government, who respectively represent the discoverers, the realising agencies and the just dispensers of nutritional practice. It was widely believed that the Association had played a part in stimulating an awareness both by Government and by industry of the means whereby better nutrition could reach the people.

The *Calcutta Workshop*, organised in November 1972, drew together research and development technologists, nutrition scientists, dairy experts, staple food processors, management men from industry, officials of various departments of both the Central and the State Government connected with nutrition, and various national and international agencies involved in the practical delivery of food under feeding and welfare programmes. In sum, these represented many aspects of the total food and nutrition system, brought together with the common objective of discussing opportunities for the delivery of better nutrition in practical ways.

Procedurally, all participants were sent a summary of the Calcutta survey data well ahead of the Workshop. Meanwhile, a few months ahead of time, four working groups were formed in the areas of Staples, Snack Foods, Beverages and Infant Foods. These comprised teams of skilled personnel drawn from various industrial organisations and Government departments. These groups were charged with the responsibility of developing, based on the Survey data, working documents in their respective areas embodying probable product concepts and other action possibilities. These reports were sent out to all participants for study some time ahead of the Workshop. Each participant was also asked to specially scrutinise the report in one area, and to come to the Workshop prepared to contribute uniquely and

substantially to the discussion. To help in starting their train of thought, a number of queries likely to arise in each area were listed and sent out to each participant. The appeal was not just to the heart, but to the mind and the imagination of each one who would be present.

The earnest desire to consider the entire operation on a realistic basis from the very start was reflected in the title of the Workshop, which was: **Nutritious Foods for Everybody**. This report is the total output of all that went into the Calcutta Workshop, 1972.

The Workshop itself was inaugurated by Mr. A. L. Dias, Governor of West Bengal, whose deep interest in food and nutrition is of long standing. At the first session, the food habits survey data were presented in clear terms, followed by a promotional strategy for a feasible but speculative product appropriate to the Calcutta area, and a discussion from the floor. At each of the four ensuing sessions, a lively presentation of the report earlier sent out was first made by members of the working group, followed by a discussion in which all those present freely participated. At a final session, a panel of all the working group Chairmen, under a Chairman-moderator, brought up for discussion before the entire gathering problems common to all innovative foods, as also the role which promotional organisations like the Protein Foods Association of India could usefully play.



Chapter II:

Inauguration

2.1 Address of Welcome by Dr. V. KURIEN Chairman, Protein Foods Association of India

**Mr. Governor, Mr. Chief
Minister and Friends,**

I am happy to welcome you to this Workshop on "Nutritious Foods for Everybody". Some may think this title optimistic, but I am sure that it will be justified by the Workshop's results.

With the help of the comprehensive food habits survey of Calcutta City, conducted by Hindustan Thompson Associates, we have an excellent opportunity to base our discussions on the true needs and preferences of the people for nutritious foods. I, certainly, share your interest in the subject, as I have been trying to sell one nutritious food to everybody for rather a long time—namely, milk, which is the most nearly complete, natural food that can be found—and several of the organisations with which I am associated are, at this moment, addressing the problem of bringing more milk more efficiently to more people, especially in cities like Calcutta.

I think we can fairly say that, as more food processors go in for low-cost nutritious foods, milk will give them a run for their money! But, no doubt, cereals, oilseeds, fish, jaggery and many other ingredients, can be formulated into attractive, low-cost nutritious foods. And such foods can provide better nutritional value for the consumer's food Rupees, especially for the poor.

Poverty must be the touchstone of food development in our country today.

Our poorer masses are compelled to spend most of what little money they have on the staples of life, but experience has shown that large-scale production, good quality and low prices can open up substantial markets for our processed foods industry.

This Workshop will be judged by the practicality with which it addresses itself to the problem of using modern food technology and marketing to provide better nutrition to our poorer masses. The very fact that we are here today—and that so many of our prominent food processing companies are represented here—indicates that our industry is indeed aware of its social responsibilities. I am sure that, as we develop practical approaches to fulfilling our share of responsibility for building the new India which is arising today, we shall receive every encouragement from our Government.

With the completion of this Workshop, our Association will have gone a considerable way toward defining the problems and opportunities which confront us. We have, I believe, a reasonable grasp of what needs to be done in such fields as nutrition education, research into low-cost ingredients and formulations, the devisement of product profiles, the development of increasingly efficient technologies—and, of course, of delivery systems which will reach low-cost, nutritious foods to the poorer people (which is often the most difficult part of the job). No doubt, we shall have a long way to go in mastering these problems, but I

believe that we will be in a position to use such knowledge as we have acquired as a springboard for playing a larger role in raising the level of nutrition for the neediest sections of our people.

In this connection, it is singularly appropriate that we should have Mr. A. L. Dias with us today. As Food Secretary of the Government of India, in 1967, it fell to him to deal with the famine that occurred in Bihar that year. It has been said that this was the first time in history when a large-scale famine was actually averted. No doubt, science and technology contributed to this victory over a hostile environment. But much of the credit goes to the people who implemented the huge feeding programmes which saved so many hungry children in Bihar, under the leadership of Mr. Dias himself.

He knows well, therefore, how science and technology can contribute to such problems as nutrition, when properly motivated workers undertake the job. Indeed, when he inaugurated our Association's first Workshop, in December 1969 in Delhi, he remarked on the happy fact that our Association was getting the leaders of the food industry involved in nutrition. Today, he can see how this involvement is continuing to grow.

The food habits survey, on which this Workshop is based, attempts to define the food problems of Calcutta in quantitative, nutritional terms. But the papers before us go further, by actually

outlining proposals for alleviating these problems. I am sure that these constructive ideas will be of interest to the Government of this State and to others involved in the delivery of nutrition.

Ladies and Gentlemen, I welcome you all. May I now request Mr. Dias to inaugurate this Workshop?

2.2 Inaugural Address by Mr. A. L. DIAS Governor of West Bengal

I applaud the initiative taken by the Protein Foods Association of India in organising this workshop in a part of the country where the problems of malnutrition and under-nutrition are not only acute but have also not received sufficient public interest. In the Eastern Region, where more than half the population live below the poverty line, there is a crying need for a strategy and a programme that can make a dent on a problem which intimately affects the health and wellbeing of the younger generation, on whose shoulder rests the main burden of building the India of our dreams. Whilst the Protein Foods Association has done some excellent work in Western and South India in highlighting the social havoc caused by malnutrition, there has been no sustained effort in this part of the country in creating a public awareness of this problem. Public apathy must be ascribed to the failure to realise the irreparable physical and mental damage done to the millions of children falling in the vulnerable age group of 0-6 years. Financial and other constraints must necessarily confine our effort only to this group though protein and calorie deficiencies also afflict the other segments of the population. The theme of your workshop is a restricted one but I hope that in your discussions you will devise concrete measures to increase public knowledge on the far-reaching implications for the community of malnutrition in the vulnerable groups. In fact, unless nutrition education is extended to the entire community.

You cannot expect ready acceptance of the low-cost nutritious foods which it is your object to produce and popularise.

It is only during the last 4 or 5 years that a serious effort has been made to focus the attention of Government and the people on the problem of nutrition. You will recall that what gave momentum to the movement for a balanced diet was the mounting of a child feeding programme covering nearly two million children during the unprecedented Bihar famine of 1966-67. The results were dramatic and demonstrated, against a backdrop of acute food shortage and hunger, what could be done to save millions of children from the dreadful effects of malnutrition. The Bihar experiment not only helped to underscore the seriousness of the problem but provided invaluable experience in evolving a strategy for tackling it. It became obvious that a National Nutrition Programme could not be sustained for any length of time based on foreign aid or sources of supply. In other words a nutrition programme could only succeed if it were indigenously based. This necessitated a survey and assessment of the protein resources available within the country and the best way of utilising them to attain our nutritional objectives. Balahar, composed of indigenous foodstuffs, provided an immediate, though not a complete answer, to the nutritionists' prayer. Limitations of men, materials and money however restricted the scope of a purely

Government-sponsored programme. There were also a host of other problems to be tackled relating to packaging, pricing, precooking and consumer acceptability.

Moreover, it was soon realised that the problem had to be tackled on many fronts. Experiments, therefore, were begun on identifying hitherto untapped sources of proteins, on stepping up the protein content of cereals, particularly wheat, on the fortification of foods commonly consumed, such as tea, salt and atta, and on the production of a low-cost nutritious food. It was largely due to the initiative of the Prime Minister that a special nutrition programme was initiated late in 1969. A National Nutritional Programme has now become an integral part of our Five Year Plan.

The Protein Foods Association, with which I have been associated since its very inception, has played a most useful role in the nutritional field. Your last annual report, which I have read with interest, reveals the wide range of your activities. The mass communication project in Maharashtra, which comprised newspaper advertisements, posters, film documentaries, a booklet on "Protein as Life", etc. was a great success. The evaluative research done has conclusively proved that the use of a wide variety of communications media has had its impact on the target population. I hope that Governments, both Central and State, will assist the Association in a nutrition education

campaign in every State. I would make a particular plea that such a campaign should be organised in West Bengal and that Government, the industry and social and voluntary organisations in this State, should cooperate in such an enterprise.

The conferences convened by the Protein Foods Association on various aspects of nutritional programmes, the test marketing of fortified atta and, above all, the food habit surveys conducted with the assistance of USAID in Maharashtra, Gujarat and South India, have resulted in the collection of a vast amount of data on the basis of which the food industry can now take decisions for the production of low-cost nutritious foods that will command consumer acceptance. The battle against nutrition cannot be waged only by Government. Various other agencies must make their contribution and, among them, I feel that the food industry can play its part not only in supplementing programmes in the public sector but also in initiating programmes of its own. Of course a certain degree of pioneering and risk is involved. Profits may not result immediately. But as I remarked when inaugurating your first Workshop in Delhi "the industry's active involvement in this field can, in the long run, bring about a perfect coincidence between self-interest and public interest. The Industry's main preoccupation so far has been with the manufacture and marketing of the more sophisticated food products which are well beyond the price range

of the low-income brackets. There is crying need and a boundless market for cheaper pre-weaning and post-weaning baby foods. There is vast scope for fortification of a whole range of food products and beverages". The analysis of food habits already made by the Protein Food Association has undoubtedly revealed the type of marketing strategy that can be adopted. In my view the objective should be, in the initial phases, to reach the low-income and middle-income groups in the urban areas. If you succeed in reaching the consumer in these sectors there is every possibility that a demand for your products will gradually develop even in the rural areas.

Better nutrition has now become a national priority and there has been a clear change in the attitude of the policy planner. This has come with the realisation that nutrition is an important aspect of economic and social development. But it is essential that there should be a multipronged assault on this problem. There is urgency about extending the field of nutrition education so that school and college students, medical and para-medical personnel, social workers and, of course, housewives are given a basic knowledge of nutrition. The approach should be pragmatic. The results of the research done in Mysore and Hyderabad have conclusively proved that even with the foods available in rural and urban areas it should be possible within the budget of the low-income group to have a

more balanced diet for the pre-school child than is the case in many households today. Unless there is a coordinated effort to deal with this problem it will assume staggering dimensions. And this for the additional reason that in India the Green Revolution, whilst it has promised self-sufficiency in cereals, has threatened lowering of the per capita availability of proteins in consequence of a gradual shift from the cultivation of pulses and oilseeds to the high-yielding varieties of foodgrains. The challenge to the agronomist, therefore, is to produce a high yielding variety of pulses and oilseeds. The agricultural policy planner must also devise ways and means of bringing about an extension of the area under legumes and oilseeds. Unless this is done we may be faced in the not too distant future with the grave prospect of a serious shortfall in the production of protein-rich agricultural crops.

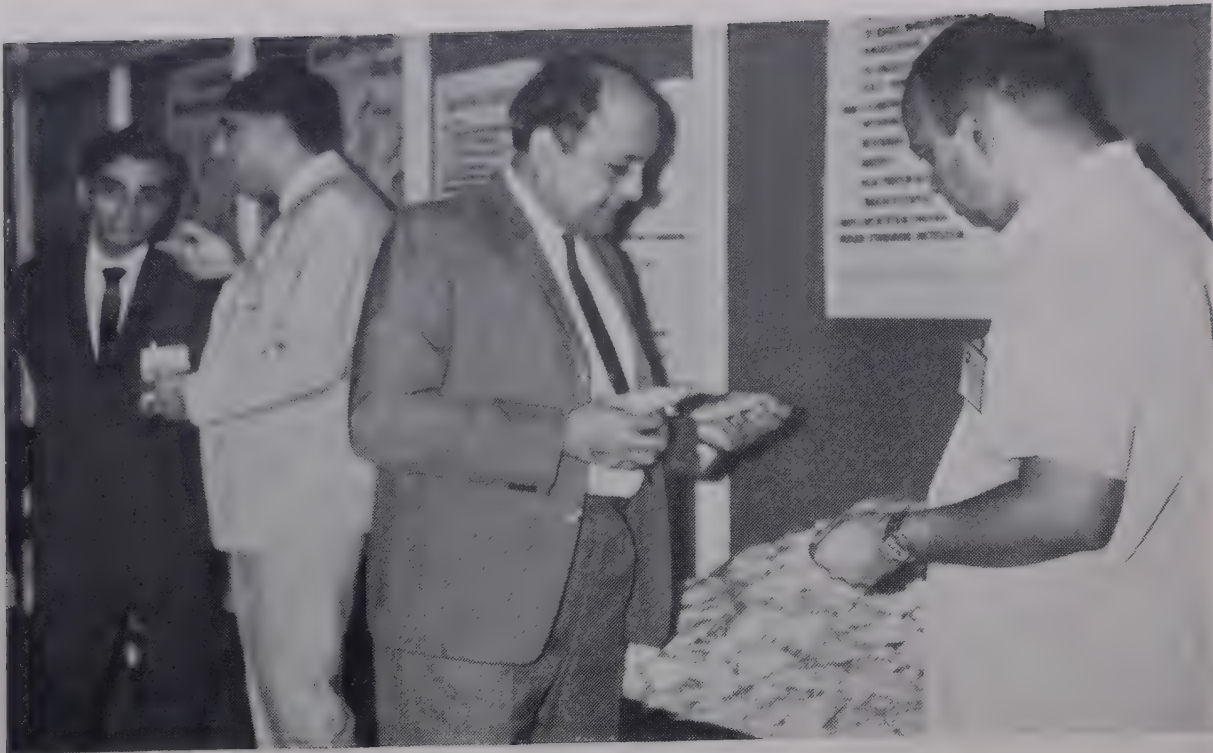
I conclude with the hope that this workshop will help in activating the industry to take concrete steps towards the development of low-cost foods acceptable to the vast segments of the people suffering from malnutrition. I hope that the Protein Foods Association will also embark on a campaign to enlist the cooperation not only of the members of food but also of other industries to devote some space in their advertisements to propagate the message of better nutrition. Once a public awareness is created the food industry should have no difficulty in marketing its products.



Inauguration by Mr. A. L. Dias



Working group presentation



Not just a product concept



Discussion point



Panel of Chairmen consider general constraints



Session in progress



Coffee break



Quizzing the survey statistics

2.3 Thanks by Mr. SUBHAS GHOSAL Hindustan Thompson Associates Ltd., Calcutta

Your Excellency, Mr. Chairman and
Fellow Delegates,

I have been called upon to conclude
the inaugural session by proposing
a vote of thanks.

We are deeply indebted to His
Excellency the Governor of West
Bengal for having taken the trouble of
inaugurating this Seminar and attending
this session.

We may be forgiven if we assume that
for our first citizen this morning's
appointment was more than just
another of his many and varied
activities. This Seminar is in a way the
fruition of our Governor's vision, the
result of his interest in a vital aspect
of the people's well-being. For it was
during his tenure as Secretary in the
Food Ministry that the Calcutta Food
Habits Survey was proposed, and
received his enthusiastic approval.

I would like to thank, too, the United
States Agency for International
Development for having sponsored and
financed the very reason behind this
Seminar—the Calcutta Food Habits
Survey.

While the consummation of long
months of effort comes at a time when
the USAID is going through a phase of
disengagement in India, the good that
has been engendered will endure. This,
I know, is cause for the deepest
gratification for all those dedicated
individuals in USAID without whose
patient support and expert counsel
the Food Habits Survey would never
have been executed.

Our most grateful thanks are due to
the sponsors of this Workshop, the
Protein Foods Association of India, and
especially to their Chairman,
Dr. Kurien, for holding the Seminar in
Calcutta at some inconvenience to their
members and staff. Although in this
instance the logic behind the choice of
venue would appear to be
incontrovertible, Calcutta these days
is seldom the chosen city.

I reserve my special thanks for the
participants who have come from afar
interrupting their busy schedules. It is
significant that they have gathered
together to confer on a problem which
a myopic viewpoint could condemn as
Calcutta's alone. The sad truth, more
and more, seems to be that what ails
Calcutta today takes little time to
afflict other, distant parts of the
country.

And so, by participating in this
Seminar, my fellow delegates, you will
be twice blessed. Blessed by the
citizens of Calcutta and blessed, again,
by the people of India.



Chapter III:

The Basis

3.1 Food Habits in Calcutta*

A summary of the survey
carried out by
Hindustan Thompson Associates Ltd.,
Calcutta

by Mr. CHITTA MITRA

I. INTRODUCTION

Nutrition is a subject of national importance. The retarded physical and mental growth of our youth is more often than not a result of under-nutrition. Protein-caloric deficiency in diets is particularly critical among weaning and pre-school children. The effects of inadequate nutritive elements in food are also manifested in mothers, the aged and the invalid.

It must be recognised that any programme of action based on the concept of giveaway nutritious foods to correct such widespread malnutrition cannot achieve long-term results.

Again, expensive nutritious foods will remain beyond the financial reach of the masses. Therefore, it is imperative to develop low-cost, readily distributed and easily sold nutritious foods.

This is not enough. Food habits are extremely difficult to change. Experience shows that many inexpensive and nutritious foods have failed to secure acceptance simply because they do not fit into the conventional meal patterns and conform to the food habits of the target population. Therefore, any nutritious food that is developed must be acceptable to the tastes and attitudes of the masses.

It is for all this that an integrated study was contemplated with two basic objectives:

1. To help identify and develop low-cost foods which are acceptable to the target population and can have a significant impact on the undernutrition problem of the country.
2. To provide guidelines for marketing commercially viable low-cost nutritious foods on a mass scale.

The problems of conducting such a study on a national scale are prohibitive in terms of organisational capabilities and financial resources. This is why as an initial step the Calcutta Municipal Corporation area, which has the highest concentration of population in the country, was selected for the study.

* A detailed report entitled "A Study of Food Habits in Calcutta" has been published on behalf of USAID, New Delhi by Hindustan Thompson Associates Ltd., Calcutta.

2. HIGHLIGHTS

Methodology

The field investigation based on a two-stage probability sampling design was carried out over a period of one year starting August 10, 1969 and covering 26,851 households through initial contacts, 2,386 households through detailed interviews and ten different local "markets". Primary data were obtained on (a) food habits of Calcutta residents, (b) attitudes of housewives towards various foods with special emphasis on foods for pre-school children aged up to four years and (c) retail prices of food items sold in different local markets.

The food habits of Calcutta residents were studied through four rounds of personal interviews with the help of a detailed questionnaire to obtain information on the socio-economic composition of households, meal patterns, eating habits, quantity and value of the different foods consumed in the home, expenditure on foods and other components of the family budget. The survey was designed so that it could establish a benchmark on food habits for different segments of the population and study seasonal variations in food consumption.

The attitudes of housewives towards various foods was studied through another survey covering (a) all sample households with at least one preschool child aged up to four years, and (b) one-third of the remaining households interviewed for the food habits study.

Retail price data on all available food items was collected from ten selected Calcutta "markets" on a regular fortnightly basis over a full year covering the period of field investigation. The data thus obtained gave an idea about the market prices of food commodities and constituted a check on the value figures secured through the food habits survey.

Population profile

As a background to an analysis of the food habits in Calcutta the study determined the basic composition of the population.

The Calcutta Municipal Corporation area has a resident population of 3.1 million. They comprise 0.5 million households; each household has just over six persons on the average. 54% are male; for every five adult males there are only four females.

41% of the households have at least one pre-school child aged up to four years. These young children constitute 9% of Calcutta's resident population.

The average household spends Rs. 300 per month on food, or only Rs. 1.66 per person a day. Over one-fifth cannot afford to spend more than one rupee a day per individual on food.

Education: Of the males, about 19% are illiterate; another 19% have an educational level of the three R's, but are close to illiteracy; 36% are literate but below the school-leaving certificate level; another 10% of the males have been educated up to the school-leaving certificate level; a considerably larger

proportion (14%) has college/university education.

Of the females, 34% are illiterate. Another 24% have attained the level of the three R's; 31% have an educational level below school-leaving certificate; and 6% have college/university education.

Employment: About 55% of the working age population, both male and female, are employed, with two persons dependent on each wage earner for support.

Meal patterns: 91% households eat non-vegetarian foods in the home. The average individual consumes two principal and two supplementary meals a day from the household kitchen. The principal meal is usually taken in the evening between 8 p.m. and 10 p.m., while during the day the working member eats in the morning between 8 a.m. and 10 a.m., and the housewife between 1 p.m. and 2 p.m. It is more the composition of the meal rather than the meal pattern which is influenced by the spending power of the people. By and large children between two and five years of age take three or even four principal meals a day. Incidentally, the composition of foods for those children makes it difficult to distinguish between principal and supplementary meals.

Overall, the taking of meals at eating houses, canteens and restaurants is rare. On any given day of the year one would find only 10% of the population taking meals not prepared in the home.

90% of those eating out on any day do not take more than one such meal. The majority (80%) of those eating out is constituted of males in the working age-groups, namely 17 to 56 years.

Babies under six months are predominantly breast fed. By the time a child completes six months, weaning starts. Breast feeding stops fully at the age of two yielding place to other foods through a gradual process. The more well-to-do a household the shorter the period of breast feeding. Between the age of six months and two years the number of feeds other than breast feeding declines from six to four irrespective of expenditure levels.

Food habits

Rice and/or wheat forms a part of the principal meals for an overwhelming majority of Calcuttans—rice mainly in the daytime and wheat chapati at night.

In general the principal meal of the day includes rice, chapati (also consumed as a supplementary item), dal, fried or boiled vegetables, meat, fish or egg curry, chhana (milk solids) and curd. Supplementary meals may include a wider variety of foods, namely tea, coffee, biscuits, bread, puffed rice, luchi, puri or paratha (forms of fried chapati), halwa or sweetened maida (wheat based snacks), chhana (milk solids), fruits, milk and other branded beverages.

For babies up to 12 months of age,

milk, baby food, sago and fruits are the principal food items.

For infants up to 2 years of age the principal food items are milk, rice, wheat atta, baby food, sago (tapioca), vegetables, tea and fruits. The importance of items like meat, fish and vegetables in the menu increases as the child grows up. Also the quantity of consumption of all items other than sago, baby food and barley goes up. The important items of consumption for pre-school children aged up to 4 years are milk, baby food, sago, bread and biscuits. Grown up children eat more rice, wheat, dal, vegetables and fish.

Generally speaking, there is not much of a variation in the consumption of food dishes over different days of the week. The low expenditure level households consume more fish and meat curry and halwa on Sundays.

The man in the home consumes more of everything than any other member. Women in all age groups generally consume a little less of every food item than the men in similar age groups.

Overall, the source of purchase does not vary widely between different expenditure level households. By and large food items are bought unpackaged. The upper expenditure level households tend to buy more packaged foods. Barley, bread and tea are more often bought unpackaged by upper expenditure level households compared with those at lower expenditure levels.

Nutritional levels

Overall, a Calcuttan consumes 909 grammes of different foods per day. However, 60% fall below this average level. This majority invariably falls in the lower economic groups—whose total household expenditure level does not exceed Rs. 300 per month.

The table (right) gives an idea of the daily per capita consumption of foods by different expenditure level households in Calcutta.

Does this quantity provide adequate nutrition?

By any accepted standard the average persons' diet was found inadequate both in calorie intake and in overall nutritional value.

Calories: For instance, the average pre-school child aged up to 4 years should get about 1,200 calories every day. However, the survey shows that 98% of the children do not get enough calories from their daily food. The diet of 81% of the children is deficient by more than 25% and that of 33% is deficient by more than 50%. The average adult requires over 2,600 calories every day; everybody in Calcutta is getting less. 92% get less than 75% of what is needed and the diet of 7% is deficient by more than 50%.

Protein: Rather interestingly, the survey does not reveal any alarming insufficiency of protein intake. Overall, people are getting the required protein (18 grammes for children and 51 grammes for adults) from their foods.

| | | | | | Low expenditure (less than Rs. 300 per month) | High expenditure (more than Rs. 300 per month) | All |
|---------------------------------|-----|-----|-----|-----|--|---|-------|
| | | | | | Grammes per day | | |
| Cereal and cereal products | ... | ... | ... | ... | 336.0 | 352.0 | 342.9 |
| Pulses and legumes | ... | ... | ... | ... | 33.2 | 43.2 | 37.2 |
| Liquid milk | ... | ... | ... | ... | 52.6 | 180.7 | 106.3 |
| Branded baby food | ... | ... | ... | ... | 0.7 | 1.0 | 0.9 |
| Fish, meat and egg | ... | ... | ... | ... | 30.2 | 63.5 | 44.1 |
| Edible oils | ... | ... | ... | ... | 16.3 | 30.3 | 22.2 |
| Vegetables | ... | ... | ... | ... | 169.5 | 268.2 | 210.9 |
| Fruits | ... | ... | ... | ... | 16.4 | 61.8 | 35.6 |
| Sugar, sugarcane, jaggery, etc. | ... | ... | ... | ... | 26.2 | 39.1 | 31.6 |
| Others | ... | ... | ... | ... | 71.2 | 86.5 | 77.5 |
| Total | | | | | 752.3 | 1126.3 | 909.2 |

Only one-third of the population, consisting both of pre-school children aged up to 4 years as well as adults, does not get the required quantity of protein from the daily diet. It should be noted that protein will not fulfil its main role as a body building agent until the calorie needs of the body are fully satisfied. Also, that the protein quantities throughout are on an as-is basis and have not been corrected for biological quality.

Vitamin A: The average pre-school child aged up to 4 years needs approximately 1,000 international units of vitamin A. The individual adult needs 3,000 international units. The survey reveals that 71% of the pre-school children do not get the required quantity of vitamin A. This

holds good for 92% of the adults. With 50% of the children (all in low income levels) the deficiency is of the order of 25% or more and with 15% the deficiency is as high as 50% or more.

Adults are a little better off. 18% are deficient in vitamin A by 25% or more and only 4% get less than 50% of what they need.

Iron: The average pre-school child aged up to 4 years needs 15 mg. of iron and the adult needs 27 mg. The adult population of Calcutta does not seem to have any deficiency as regards iron. However, the children do show a deficiency in iron inasmuch as 9% get 75% or even less than what they need. Only 2% do not get 50% or more of iron content in their foods.

(It should be mentioned here that the data on iron intake in foods is of questionable validity. The iron particles which get into ground atta milled by wayside millers are adventitious in nature, and the degree of absorption is not known. Even iron absorption from common foods is a controversial topic. Iron storage scores in the Indian body are among the lowest in the world—suggesting very inadequate consumption.)

Calcium: The pre-school child aged up to 4 years needs 470 mg. of calcium and the adult requirement is 500 mg. In Calcutta 50% of the children and 32% of the adults are deficient in calcium. Roughly one-third of both the children and adults get less than 75% of what they need. 7% of the children and 18% of the adults do not get even 50% of what they require.

Figure 1 and Figure 2 illustrate these findings.

Attitudes of housewives towards foods

By and large, the housewives are not happy with the foods normally consumed in the home. If the housewife could afford them, she would buy more health-giving foods for her children as well as for the adults in the home. For babies, mothers would prefer milk, rice, branded baby foods, fruits, biscuits, fish, sago and barley, while children and adults should be eating more rice, meat, milk, vegetables, fruits, fish, egg, chapati and dal.

The survey also sought to determine a variety of attitudes towards food products and possible new developments in eating habits.

The consensus is that packaged foods are expensive but are good for children.

Concerning canned baby foods, most housewives feel that the quality is very good but they are rather expensive. If baby foods are priced reasonably, they would be quite popular among all economic classes. The two most frequently quoted reasons that motivated mothers to buy a new baby food were: "the food improves the health of the child" and "the doctor recommends the food".

"Between two alternative baby foods the one which does not need cooking has greater appeal to mothers" is the opinion of the majority of housewives. Opinions of the mother, doctor and father in that order are important in choosing foods for babies.

The housewives do not display much psychological resistance towards the use of packaged foods. Only about one-third of the housewives agreed with the statement that "only lazy housewives go in for packaged foods". Slightly more than a third, however, felt that "packaged foods are frequently adulterated."

While mothers express a strong interest in promoting the good health of their children, the survey finds a general unfamiliarity with the terms protein, carbohydrate, calorie,

mineral, or fat. The word vitamin, however, is familiar to 64% while 56% know its correct meaning—double the awareness of any of the other terms.

The study shows that a majority of the respondent housewives are not satisfied with the types of food normally consumed in the household. Percentages of dissatisfied housewives decrease as per capita expenditures increase.

The data reveal that:

- Chhatu (de-husked Bengal gram flour), maize and soyabean are not liked at all.
- Groundnut, salted snacks and tea are not considered by mothers to be good foods for their children, but the children like them.
- Biscuits, bread, butter, chhana (milk solids), maida (finely-ground wheat flour), milk, pulses, rice and vegetables are highly liked by both mothers and children. There is no particularly noticeable variation in attitudes between households with different income levels.
- Canned baby foods, curd, chira (parboiled rice soaked in water and then flaked), egg, fish, meat, fruits, muri (puffed rice), sooji (broken barley) and wheat atta are liked by both mothers and children of all expenditure levels.
- For barley, khai (parched paddy), lozenges, toffee, candy etc., there is a high degree of preference among

both mothers and children, but the degree of preference decreases as per capita expenditure increases.

Implications

For the policy planner: The information should be valuable in assisting his efforts to identify those areas where appropriate action programmes can make optimum contributions towards ensuring better nutrition for the most critical segments of the population. Additionally, the study highlights the need for initiating similar investigations in other parts of the country to obtain guidelines for a nationwide nutrition programme.

For the food industrialist: The study should help develop commercially viable, more nutritious and acceptable foods which will be within easy reach of the poorer and more vulnerable sections of the population.

It is generally recognised that no programme of action based on the concept of giveaway nutritious foods can correct the widespread problem of undernutrition and achieve long-term results. Again, nutritious but expensive foods will remain beyond the reach of the masses. Also, any nutritious food that is developed must be acceptable to the tastes, preferences and attitudes of the people.

Considering all this the study indicates that there is scope for the food industry to initiate specific action towards developing and marketing low-cost, nutritionally-enriched, acceptable foods.

For the nutrition scientist: The study should help his efforts towards more practical programmes keeping in view the tastes and preferences of the people.

For the social scientist: The study should enable him to move closer to the realities of the situation, and towards developing new ideas more objectively for the welfare of the most vulnerable sections of the population.

FIGURE 1 **REQUIRED VS. ACTUAL NUTRIENT INTAKE**

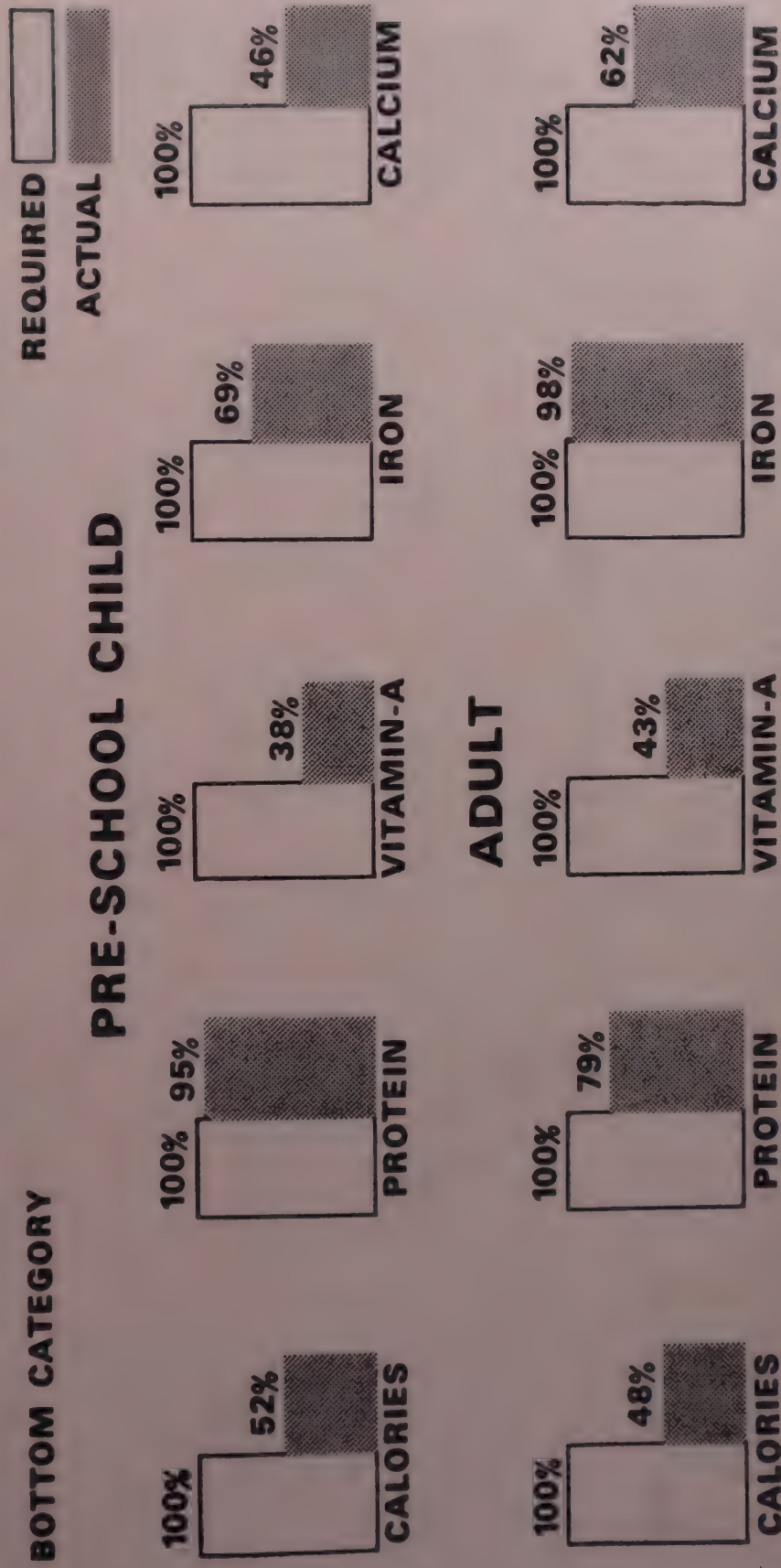
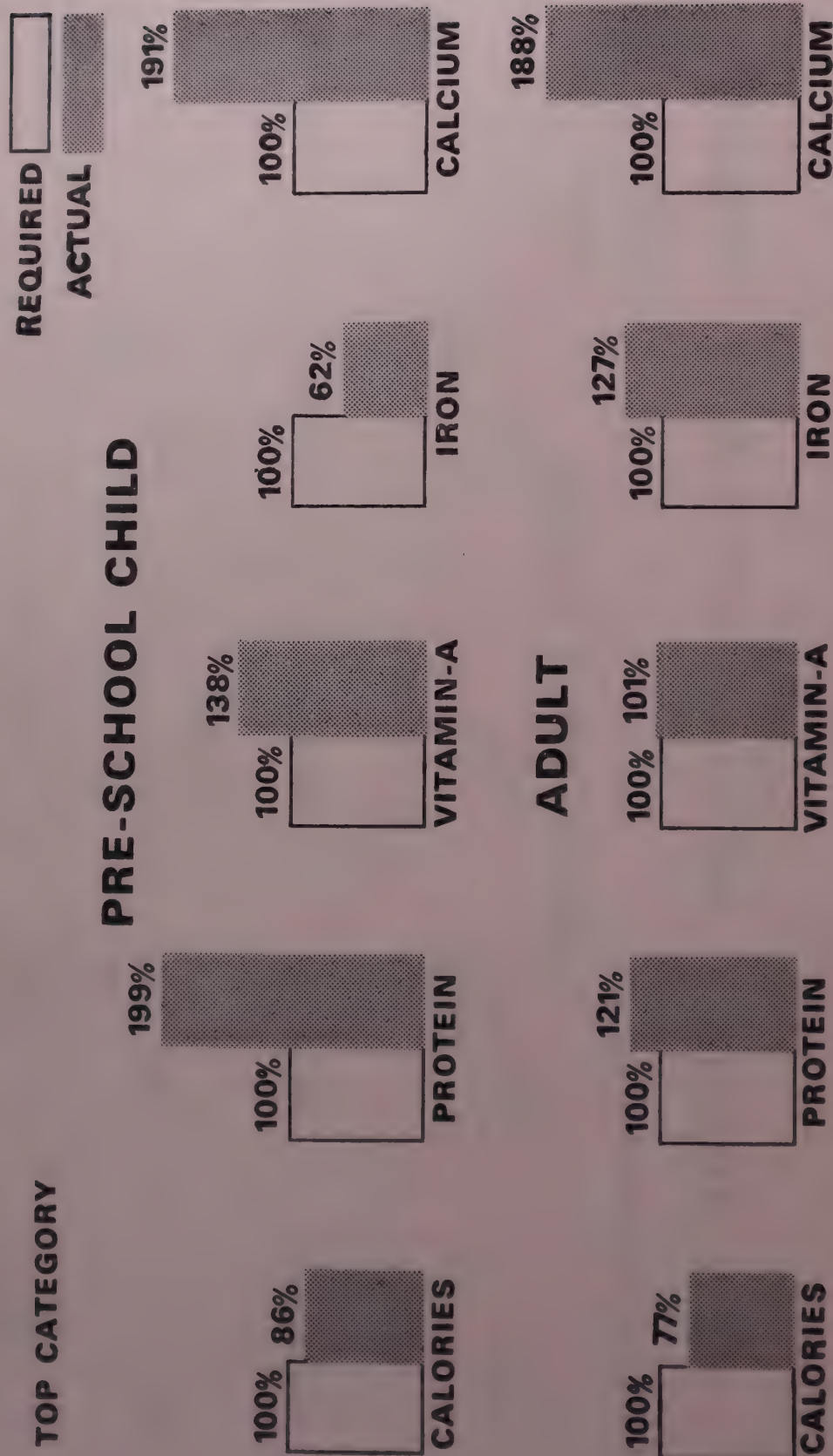


FIGURE 2
REQUIRED VS. ACTUAL NUTRIENT INTAKE



3. METHODOLOGY

The study was divided into two broad areas of investigation. *Food habits survey*: to ascertain household food habits and other environmental factors influencing dietary patterns. *Attitudes survey*: to get an idea of housewives' attitudes towards various foods and food concepts.

Sampling design

First round of the food habits survey: Since one of the basic objectives of the study was to establish the nutritional value of the average person's diet, the survey had to be so designed that the results remained unaffected by the period of interview. To ensure this, the initial benchmark survey on consumer food habits forming the first round of investigation was spread over nine weeks. This offset the effects of variation in household consumption of foods between the beginning and the end of the month. Moreover, interviews were uniformly spread over different days of the week to control any possible bias arising out of a variation in the weekly pattern of consumption of foods.

The Calcutta Municipal Corporation area was arbitrarily divided into 4,583 small and contiguous geographical area segments, termed blocks. Each block consists of approximately 110 households which have a large measure of homogeneity in the socio-economic characteristics of the population.

To select the households a two-stage probability sampling design was

adopted. The sample blocks formed the first-stage unit. The sample households within a block formed the second-stage unit.

A pooled sample was generated from three independent and equivalent sub-samples, each giving an independent and equally valid estimate. This procedure has the advantage of evaluating the precision of estimates derived from each sub-sample as well as the combination of sub-samples.

A sample of 243 blocks was selected at random from the universe of 4,583 blocks. The selected blocks were then allotted to three sub-samples, each having 81 blocks. The 81 blocks forming a sub-sample were further subdivided into nine equal groups, and a set of nine blocks was assigned to each of the nine weeks of investigation. Provision for substitution was made whenever a block was found to have been formed by hotels, army camps or any other non-household type establishments.

All households within a sample block were listed with necessary identification details, such as the name of the main earner, municipal premise number and postal address. The list of households thus prepared was used for selecting every 11th household with a random start. The selected households were then allotted to different days of the week for detailed interviews. No control was exercised over per capita expenditure or occupation of the main earner for a sample household.

The similar distribution found for sample households by monthly per capita total expenditure, occupation groups over different weeks of interview and also over different days of the week of interview show their representative character. Moreover the same distribution was repeated week after week, also between different days within a week.

Seasonal surveys: In addition to the basic food habits survey three additional surveys were carried out during the period of one year to study seasonal variations in consumption. Each seasonal survey was spread over a period of four weeks with a gap of one day after a week or two so as to cover the span of 30 or 31 days of a calendar month. A sample of 280 households distributed evenly over 28 days of a month was interviewed in each round. These households were selected from amongst those covered by the first survey. In other words, the three seasonal surveys were carried out in the form of repeat surveys. The selection of households was made on the basis of proportional representation from different groups of households. The households were segmented according to the existence of pre-school children aged up to 4 years, vegetarian and non-vegetarian food habits, occupation of the main earner and per capita expenditure levels.

Although every effort was made to interview the same set of households in all the three repeat surveys, this could not be universally achieved.

When this was impossible, a randomly pre-selected substitute falling in the same household segment was interviewed.

Attitudes survey: The survey was designed to pay special attention to problems relating to the food of pre-school children aged up to 4 years. Therefore all households which were found in the course of the first round of the survey to have had at least one pre-school child aged up to 4 years were selected for the attitudes survey. Moreover every third household from the list of those without a pre-school child was also selected.

Price collection survey: The major local "markets" in different parts of the city were selected for the collection of price data on various food items. Prices were checked on the same day once every two weeks at all the 10 markets over one calendar year.

Field operation

Organisation: Altogether 48 experienced and fully trained female interviewers were employed on the basic food habits survey. They were divided into six batches. Each batch of 8 interviewers worked under a group leader. Thus there were 6 group leaders in all. These 6 group leaders formed 3 sub-samples, each sub-sample having 2 group leaders working under one supervisor. The whole field operation was under the overall control of a senior field controller. Therefore the entire field operation involved 58 persons: 48 interviewers, 6 group leaders, 3 supervisors and one overall field controller—all working

exclusively on the project.

Of the 48 interviewers, 39 worked in the field on any given day. The remaining 9 interviewers were kept in reserve.

An interviewer carried out only one interview a day. To complete an interview with a housewife she had to visit the household two or three times during the day. This was arranged with a view to (a) establishing necessary rapport with the respondent housewife, (b) getting all relevant information with due precision and (c) reducing the fatigue involved in a long interviewing session.

The organisational structures of the seasonal surveys, price collection survey and attitudes survey were basically the same. There were variations in the number of people engaged for the different assignments.

Interviewing: The questionnaires used for interviewing sample respondents for the different surveys were given final shape after several rounds of pretesting and pilot testing.

Since the basic food habits survey was designed to secure data on the consumption of different food items with necessary precision, all precautions were taken to ensure accurate reporting of the quantity figures. The interviewers were thoroughly trained on the average weights of such commonly used measures and expressions as a cupful of milk/rice, a large/medium/small apple or banana etc. They were also

supplied with tables on standard weights of such measures as a tea-spoonful of sugar, a cupful of milk/rice, different types and sizes of fruits, vegetables, fishes etc.

The housewives, by and large, were very cooperative. The length of the questionnaire did not pose a problem. Each interview relating to the basic food habits survey took about three hours on the average.

Food habits: The questionnaire on the basic food habits survey secured information on:

- (i) the usual details of household demographics
- (ii) quantities of different food items consumed by pre-school children aged up to 4 years at different hours of the day by different food and meal types, such as principal, supplementary or uniform meals
- (iii) food dishes served in the household at different hours of the day by meal type i.e. whether the dish was served exclusively as part of the principal/supplementary meal or as part of the principal meal for some members and supplementary meal for others
- (iv) intra-family distribution of quantities of foods consumed
- (v) quantities of food items taken outside (not prepared in the household kitchen) by household members
- (vi) purchase habit (frequency, source, packaged or loose, quantity last

bought and amount paid for the last purchase) and quantities of consumption of 394 items.

The questionnaire for the basic food habits survey was also used for the seasonal surveys.

Price data: A simple proforma was used for the collection of price data. All food items are not always sold in terms of their weights as the unit of measurement. In such cases the interviewers had to make use of the conversion table showing the weight of an item for each commonly used unit of measurement. On many occasions the conversion had to be made at the stage of processing the data. For instance, a cauliflower is often sold as a piece. The average weights of different sizes of cauliflowers were considered while recording price per kg. Similar other problems had to be dealt with according to the nature of the problem. It may be mentioned here that the price of fish and meat is *not* shown for each kilogramme of net flesh; the price per unit includes the weight of bones, head of the fish, scales etc.

Attitudes survey: The questionnaire for the attitudes survey secured information relating to the following aspects:

- (i) are housewives satisfied with the foods normally consumed in the home?
- (ii) what foods do housewives normally like to serve to the members of the family falling in

different age groups and for what reasons?

- (iii) housewives' disposition towards packaged foods, vegetarian and non-vegetarian foods in general and certain other specific items like meat, fish, milk etc
- (iv) housewives' awareness of different nutrients in diets
- (v) housewives' preference for different foods for babies
- (vi) housewives' preference for additive flavour in selected food items
- (vii) housewives' impressions on the quality and price of canned baby foods
- (viii) housewives' opinion on the marketing feasibility of reasonably priced new baby foods
- (ix) housewives' attitudes towards uncooked versus ready-to-eat baby foods
- (x) housewives' opinion on the decision making role of different persons concerning foods for babies
- (xi) housewives' preference for different equipment used for measuring and feeding the babies
- (xii) factors influencing housewives' decision on the consumption of baby foods.

Concepts and definitions

The concepts and definitions used for

conducting the study have been explained in the instructions to interviewers.

Food Investigation Schedule

1. Food Habits Survey:

First round : August 10, 1969 to October 11, 1969

Second round: December 17, 1969 to January 16, 1970

Third round : March 16, 1970 to April 15, 1970

Fourth round : June 16, 1970 to July 15, 1970

2. Price Collection Survey: October 10, 1969 to September 25, 1970

3. Attitudes Survey: October 27, 1969 to December 3, 1969

4. POPULATION PROFILE

Calcutta's population

The survey estimates show that the Calcutta Municipal Corporation area has a resident population of 3,112,000 with an average household size of 6.23. Estimates derived from the three independent sub-samples are closely comparable. The sub-samplewise break-up figures are given below:

| | Number of persons | Average household size |
|--------------|-------------------|------------------------|
| Sub-sample 1 | 3,210,000 | 6.35 |
| Sub-sample 2 | 3,055,000 | 6.13 |
| Sub-sample 3 | 3,068,000 | 6.22 |
| All | 3,112,000 | 6.23 |

The provisional estimates obtained from the 1971 Census¹ show that the Calcutta Municipal Corporation area has a population of 3,141,180. This includes persons living in hotels, army camps and police barracks. However, the survey assumes the household as the basic unit. Therefore, persons living in hotels, army camps and police barracks have been left out. Pavement dwellers are not included either in the Census or this Survey. Therefore, the Census figures and the survey totals can be said to be closely comparable. Moreover, the sub-sample estimates are indicative of the validity of the sampling procedure.

Age-sex composition

Calcutta has a relatively larger proportion (53.6%) of male

population. Females constitute 46.4% of the total population. The table below shows the preponderance of males in the working age-group, namely 17-56 years.

| Age-group | Male | Female | Total |
|-------------------|------|--------|-------|
| Percentages | | | |
| 0-16 years | 20.1 | 19.2 | 39.3 |
| 17-56 years | 30.2 | 23.9 | 54.1 |
| 57 years and over | 3.3 | 3.3 | 6.6 |
| Total | 53.6 | 46.4 | 100.0 |

¹Census of India 1971:
Paper I of 1971: Supplement
Provisional Population Totals
Registrar General and Census Commissioner,
India

It is interesting to note that in the school-going population in India boys outnumber girls. Again, a larger proportion of the urban males in India seeks gainful employment. The age-sex composition of the Calcutta population reflects the same tendency.

Education

Amongst males approximately 19% are illiterate; another 19% have an educational level of the three R's but are close to illiteracy; 36% are literate but are below the school-leaving certificate level; another 10% of the males have been educated up to the school-leaving certificate level; a considerably large proportion (14%) has had college/university education.

Amongst females 34% are illiterate. Another 24% have attained the level

of the three R's, 31% have an educational level below the school-leaving certificate, and 6% have had college/university education.

Employment

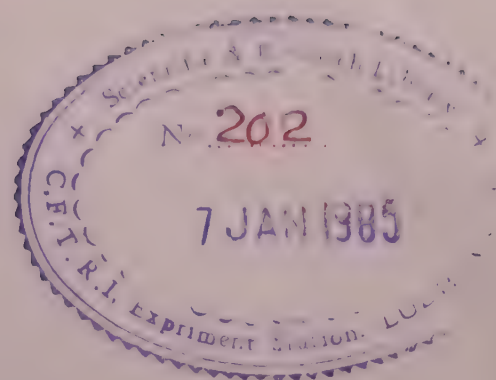
Only 32% of the population are gainfully employed. They constitute 55% of the working age group population. 15% comprise manual workers of the skilled and unskilled categories, 4% small traders, 2% businessmen, 5% clerical workers, 1% officers, 3% professionals, 1% landlords/rentiers/pensioners and 2% miscellaneous.

Income

67% of the population in Calcutta have no income at all. Thus each wage earner has two dependents to support. 27% earn less than Rs. 500 a month. Only 3% earn more than Rs. 500 per month. No information on income was available from 3% of the respondents. Those earning less than Rs. 500 per month can be sub-divided into four groups, namely less than Rs. 75: 9%; Rs. 75-150: 7%; Rs. 150-300: 7% and Rs. 300-500: 4%.

Pre-school children

Households having at least one pre-school child aged up to 4 years constitute 41% of the total household population of Calcutta. Low expenditure level households have a larger number of pre-school children. For instance 60% of the households with a monthly per capita expenditure of less than Rs. 30 have at least one pre-school child. Conversely only 20% of the



households with a monthly per capita expenditure of over Rs. 125 have a pre-school child.

Some interesting figures are given below:

| | Households with at least one pre-school child aged up to 4 years | Households without any pre-school child | All households |
|--|--|---|----------------|
| Proportion of households, % | 41 | 59 | 100 |
| Proportion of population, % | 49 | 51 | 100 |
| Average household size | 7.56 | 5.33 | 6.23 |
| Number of children aged upto 4 years per household | 1.40 | — | 0.57 |
| Number of married women per household | 1.37 | 0.97 | 1.13 |
| Monthly per capita expenditure per household | Rs. 58.52 | Rs. 85.95 | Rs. 72.28 |

Religion
Hindu households comprise 86% of the population in Calcutta. Muslim households account for 10% of the population. Christian and Jain households constitute only 1% each. Other religions are not numerically important. There seems to be no correlation between religion and household size.

The Hindu households representing 86% of the population comprise Brahmins: 19%; Kayasthas: 26%; Vaidyas: 3%; and the rest: 38%.

Meal patterns

91% households eat non-vegetarian foods at home. Only 9% are

vegetarians. There is no appreciable difference in household size between vegetarian and non-vegetarian type households. The number of non-vegetarian households is marginally higher among the poorer sections of the population. Vegetarian households are more often encountered amongst those with a monthly per capita expenditure of over Rs. 40.

The average individual consumes two principal and two supplementary meals a day from the household kitchen. Children aged 2-4 years, by and large, take over three principal meals cooked in the household kitchen. Incidentally, the composition of foods for these children makes it difficult to distinguish

between principal and supplementary meals. It is more the composition of the meal rather than the meal pattern which is influenced by the spending power of the people.

The taking of meals at eating houses, canteens and restaurants is rare. On any given day of the year one can find only 10% of the population taking meals not prepared in the household kitchen. 90% of those eating out on any day do not take more than one such meal. The majority (80%) of those eating out is constituted of males in the working age-group namely 17-56 years.

Baby feeding practices

Babies under six months are predominantly breast fed. About 40% of the babies under six months are exclusively breast fed and the rest are given some liquid diet in addition to mother's milk. By the time a child completes six months, weaning starts. Past the age of one year, only 2% of the children aged 1-2 years continue to be exclusively breast fed. Breast feeding stops altogether at the age of two yielding place to other foods through a gradual process. The more well-to-do a household the shorter the period of breast feeding. As the child grows from six months to two years, the number of feeds other than breast feeding decreases from six to four irrespective of expenditure levels. Baby feeding practices are influenced more by household income than by the occupation of the main earner or the eating habits of the household.

5. FAMILY BUDGET

Any survey on household food consumption habits would be incomplete without corresponding data on the family budget. Food habits apart, the quality of foods consumed is influenced to a large extent by the spending power of the household.

The data on family budgets was secured in two ways. The introductory part of the questionnaire on the basic food habits survey included questions on average monthly household income and expenditure. These two items featured among the household classificatory data. Moreover, expenditure data on each individual item of food consumed and each group

of non-food items were obtained in the course of the detailed interview.

The analysis shows that there is an element of response bias inasmuch as the classificatory data on household income and expenditure tends to suffer from under-reporting. This is primarily because the respondents generally tended to equate the overall household expenditure with household income. Since an overwhelming majority of the population belongs to the wage-earning families, the response is more often inhibited by the feeling that in overall terms the total monthly household expenditure should not exceed the total monthly household income. Nonetheless, the respondent forgets to include the earnings in the form of

bonus, overtime payments etc. as part of the total income. Also he excludes dis-saving in one form or another as part of the total expenditure.

The under-reporting of the classificatory data on household expenditure is reflected in the discrepancies between the household expenditure level and the actual expenses incurred by the household.

The following table provides a summary of the family budget situation.

Proportion of expenses under different heads by per capita expenditure class

| Broad groups of items | Up to Rs. 20 | Rs. 20-40 | Rs. 40-60 | Rs. 60-100 | Over Rs. 100 | All |
|----------------------------------|-----------------|-----------|-----------|------------|-----------------|---------|
| Foods | 67.16 | 63.35 | 58.16 | 51.45 | 40.75 | 50.65 |
| Tobacco products | 2.04 | 1.85 | 1.70 | 1.68 | 1.53 | 1.67 |
| Fuel and light | 4.00 | 3.88 | 3.97 | 3.56 | 3.50 | 3.66 |
| Clothing etc. | 4.91 | 4.79 | 4.97 | 5.34 | 5.92 | 5.41 |
| Misc. goods and services | 12.55 | 15.61 | 18.32 | 21.73 | 24.20 | 20.92 |
| Durable and semi-durable goods | 2.22 | 2.65 | 3.96 | 4.42 | 6.29 | 4.74 |
| Rents and taxes | 6.11 | 5.70 | 5.71 | 6.57 | 9.06 | 7.26 |
| Other misc. expenses | 0.76 | 1.10 | 1.01 | 1.18 | 1.80 | 1.37 |
| Remittances | 0.16 | 0.69 | 1.32 | 1.63 | 1.96 | 1.52 |
| Savings | 0.09 | 0.38 | 0.88 | 2.44 | 4.99 | 2.80 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Total monthly expenditure (Rs.) | 35.92 | 52.39 | 77.61 | 112.41 | 203.50 | 98.48 |
| Proportion of sample persons ... | 9.93% | 27.28% | 20.83% | 22.95% | 19.01% | 100.00% |

The conclusions would appear to run as follows:

- (i) the average Calcuttan spends over 50% of his total monthly expenditure on foods. This highlights the urgent need for developing low-cost nutritious foods for an overwhelming majority of the population.
- (ii) only the top 19% of the population can afford to spend 60% of the total on non-food items. They represent the privileged Calcuttans with a significantly large discretionary spending power. Roughly one-fourth of their total expenditure goes to miscellaneous goods and services covering luxuries, amusement, education, books and periodicals, toiletries, conveyance, ceremonials etc.
- (iii) the bottom 10% of the people spend two-thirds on food. Only one-third goes to non-food items. In the absence of any yardstick to measure the impact of urbanisation over the years, it would be of interest to note that even these people spend nearly 13% on miscellaneous goods and services.
- (iv) the share of expenditure on rents and taxes is relatively high (6%) at the lowest level. Again, with a mere 9% share in the total expenditure the well-off Calcuttan seems to be spending less on housing. In other words, it appears that the housing problem is more

acute for people at the lower expenditure levels in Calcutta.

- (v) 42% of the Calcutta population do not have any savings to fall back on in emergencies.
- (vi) the problem of malnutrition and consequently the problem of health and hygiene can be gauged from the fact that the bottom 10% of Calcuttans spend nearly 3% on medicines whereas the top 19% spend roughly 2% of their total expenditure. The seriousness of the problem is, of course, aggravated by the fact that the poorer sections of the population have hardly any surplus to spend on medicines. Whereas the average Calcuttan spends approximately Rs. 3 per month on medicines the bottom 10% of the population cannot afford to spend more than a rupee a month per person. The amount spent on medicines goes up as the household expenditure level rises, and a person in the per capita expenditure level of Rs. 400 and above spends about Rs. 8 a month on medicines.

Expenditure on foods

Since foods alone take away 50% of the family budget, it would be of interest to study the nature and composition of the food budget.

The average person spends Rs. 1.58 on food per day. The important components of the daily expenditure on food are—cereals: 43 paise; fish, meat and egg: 25 paise; fruits and

vegetables: 23 paise; milk: 16 paise. These four groups together account for 68% of the food budget.

However, the food budget of the bottom 10% of the population differs radically from that of the top 19%. The bottom 10% fall in the total monthly per capita expenditure level of up to Rs. 20, and the top 19% belong to the level of over Rs. 100. The proportion of the daily food budget spent by these two categories of persons on certain specific food groups would highlight the situation:

| Food group | Share in the daily food budget of the | | |
|---------------------|---------------------------------------|-----------------------------|-------------------|
| | bottom cate- gory person | top cate- gory person | average person |
| Percentages | | | |
| Cereals | 46 | 17 | 27 |
| Pulses | 5 | 2 | 4 |
| Milk | 4 | 13 | 10 |
| Fish, meat, egg | 8 | 20 | 16 |
| Edible oils | 6 | 7 | 7 |
| Vegetables | 9 | 10 | 11 |
| Fruits | 1 | 6 | 4 |
| Sugar, jaggery etc. | 5 | 3 | 4 |

Thus the poorer person spends relatively more on cereals and pulses. He has hardly any money to spend on more nutritious foods like meat, fish, egg and milk. This can be confirmed from the average daily expenditure

on certain specific food groups by individuals in different expenditure levels, as seen in the following table:

| Food group | Average daily expenditure by an individual belonging to the monthly expenditure level of | | | | | |
|----------------------------|--|-----------|-----------|------------|-----------------|-----|
| | Up to Rs. 20 | Rs. 20-40 | Rs. 40-60 | Rs. 60-100 | Over Rs. 100 | All |
| All figures below in Paise | | | | | | |
| Cereals ... | 36 | 43 | 45 | 45 | 45 | 43 |
| Pulses ... | 4 | 5 | 6 | 7 | 7 | 6 |
| Milk ... | 3 | 6 | 13 | 20 | 35 | 16 |
| Fish, meat, egg | 6 | 12 | 22 | 29 | 53 | 25 |
| Edible oils ... | 5 | 7 | 10 | 13 | 18 | 11 |
| Vegetables ... | 7 | 11 | 16 | 21 | 25 | 17 |
| Fruits ... | 1 | 2 | 5 | 9 | 16 | 7 |
| Sugar, jaggery etc. ... | 4 | 5 | 5 | 7 | 8 | 6 |

6. FOOD HABITS

Eating habits

The survey data shows that today both rice and wheat form a part of the principal meals of Calcuttans. An overwhelming majority of the Calcutta households eat rice in the daytime and wheat chapati at night. Even those who can afford to buy rice at a higher price also eat wheat chapati. 69% of the households with an average monthly per capita expenditure of over Rs. 100 eat wheat chapati as a part of their principal evening meal.

The two principal meals include, in addition to rice and chapati, items like dal, fried or boiled vegetables, meat, fish or egg curry, chhana (milk solids) and curd.

Wheat chapati is more popular as a part of the morning and late afternoon supplementary meals. The proportion of households consuming chapati as a part of their supplementary meals tends to decline with an increase in the spending power of the households.

Supplementary meals may include a wider variety of foods, namely tea, coffee, biscuits, bread/loaf, puffed rice, luchi/puri/paratha (forms of fried chapati), halwa or sweetened maida (wheat-based snacks), chhana (milk solids), fruits, milk and other branded beverages.

The consumption of bread/loaf and biscuits increases with a rise in the expenditure level of the household; it appears that there is a shift from chapati to bread and biscuit as the

expenditure level goes up.

There is not much variation in the consumption of food items over different days of the week. However, households in the lower expenditure levels eat more fish on Sundays; on other days they just cannot afford it. Again, for the same reason a larger percentage of households eat meat curry on Sundays than on other days of the week. Among snack foods even halwa features as a delicacy with the low expenditure level households and is consumed more often on Sundays and holidays.

The table following shows the daily consumption pattern of the various food dishes by households belonging to the different per capita expenditure levels.

Proportion of consuming households in each monthly per capita expenditure level

| Food dishes | Up to Rs. 20 | Rs. 20-40 | Rs. 40-60 | Rs. 60-100 | Over Rs. 100 | All |
|-----------------------------------|-----------------|-----------|-----------|------------|-----------------|------|
| All figures below are percentages | | | | | | |
| Rice | 89 | 94 | 96 | 94 | 95 | 94 |
| Chapati ... | 96 | 96 | 92 | 92 | 85 | 92 |
| Dal | 79 | 85 | 87 | 85 | 85 | 85 |
| Fried vegetables | 24 | 36 | 39 | 47 | 46 | 40 |
| Boiled | | | | | | |
| vegetables ... | 16 | 14 | 16 | 17 | 16 | 16 |
| Vegetable curry | 63 | 75 | 85 | 84 | 89 | 81 |
| Fish soup ... | 1 | 1 | 3 | 2 | 5 | 2 |
| Fish curry ... | 20 | 32 | 37 | 45 | 53 | 40 |
| Meat curry ... | 10 | 9 | 10 | 11 | 15 | 11 |
| Egg boiled ... | — | 0 | 3 | 4 | 19 | 6 |
| Egg curry ... | 1 | 3 | 6 | 8 | 9 | 6 |
| Chutney ... | 1 | 3 | 5 | 8 | 10 | 6 |
| Pickles ... | — | 1 | 2 | 3 | 3 | 2 |
| Papads ... | 0 | 1 | 2 | 4 | 5 | 3 |
| Curd | 1 | 3 | 2 | 8 | 16 | 7 |
| Tea | 93 | 95 | 95 | 95 | 93 | 94 |
| Coffee ... | — | — | 0 | 1 | 5 | 1 |
| Biscuits ... | 21 | 29 | 36 | 42 | 51 | 38 |
| Puffed rice ... | 21 | 24 | 29 | 25 | 16 | 23 |
| Rice flakes ... | 1 | 3 | 3 | 5 | 8 | 4 |
| Loaf (bread) ... | 13 | 24 | 29 | 44 | 66 | 38 |
| Luchi/Puri ... | 0 | 2 | 4 | 6 | 16 | 6 |
| Paratha ... | 1 | 5 | 11 | 11 | 13 | 9 |
| Kachuri/Dalpuri | 8 | 6 | 4 | 3 | 2 | 4 |
| Singhara (veg.) | 2 | 3 | 4 | 7 | 4 | 4 |
| Halwa | 6 | 6 | 6 | 7 | 7 | 6 |
| Chhana ... | — | 1 | 1 | 3 | 6 | 2 |
| Sweet (chhana). | — | 2 | 3 | 6 | 15 | 6 |
| Sweet (maida)... | 3 | 4 | 6 | 5 | 3 | 5 |
| Apple | 0 | 2 | 3 | 6 | 12 | 5 |
| Banana ... | 3 | 4 | 6 | 15 | 30 | 13 |
| Musambi ... | 0 | 0 | 2 | 2 | 6 | 2 |
| Other fruits ... | 3 | 2 | 6 | 7 | 8 | 5 |
| Horlicks ... | 1 | 2 | 4 | 7 | 9 | 5 |
| Bournvita ... | — | 0 | 1 | 2 | 5 | 2 |
| Milk | 9 | 20 | 35 | 50 | 69 | 40 |
| Numbers | | | | | | |
| Number of sam- ple households | 204 | 601 | 490 | 572 | 519 | 2386 |

Quantity of foods consumed

The average Calcuttan consumes 909 grammes of different foods per day. However, 60% of the population with a daily per capita expenditure of less than Rs. 2 fall below this average level of consumption.

The table below shows the average daily per capita consumption of foods by the different expenditure level households in Calcutta:

| Food group | Quantity of foods in grammes (0.0) consumed by an individual in each per capita monthly expenditure class | | | | | | All |
|------------------------------------|---|------------|------------|-------------|--------------|--|-------|
| | Up to Rs. 20 | Rs. 20 —40 | Rs. 40 —60 | Rs. 60 —100 | Over Rs. 100 | | |
| Cereals and cereal products | 301.4 | 335.8 | 354.4 | 354.9 | 348.6 | | 342.9 |
| Pulses and legumes | 27.0 | 31.9 | 37.8 | 42.8 | 43.6 | | 37.2 |
| Liquid milk | 19.7 | 38.5 | 86.8 | 133.1 | 238.1 | | 106.3 |
| Branded baby food | 0.4 | 0.7 | 0.9 | 0.9 | 1.0 | | 0.9 |
| Fish, meat and egg | 19.1 | 26.2 | 40.8 | 50.2 | 79.5 | | 44.1 |
| Edible oils | 10.0 | 15.1 | 21.0 | 26.5 | 34.9 | | 22.2 |
| Vegetables | 105.4 | 162.0 | 210.0 | 253.8 | 285.7 | | 210.9 |
| Fruits | 5.8 | 11.8 | 27.5 | 46.4 | 80.3 | | 35.6 |
| Sugar, jaggery etc. | 20.6 | 25.1 | 30.2 | 36.0 | 42.9 | | 31.6 |
| Others | 72.5 | 70.6 | 71.4 | 86.0 | 87.2 | | 77.5 |
| Total | 581.9 | 717.7 | 880.8 | 1030.6 | 1241.8 | | 909.2 |

Intra-family distribution of foods

The individual nutritional levels cannot be determined unless the quantities of the different types of foods consumed by an individual are known. To secure this information the share of each

individual member in the consumption of 40 different groups of food items was ascertained first.

The resulting data reveal that the man in the home consumes more of everything than any other member.

Women in all age groups generally consume a little less of every food item than men in similar age groups. The exceptions are puffed rice and leafy vegetables; these are consumed in larger quantities by women. Liquid milk is consumed largely by children aged up to 10 years. However, the highest intake of milk is in the age group of 1 to 3 years.

Foods for pre-school children

The children may be classified into three broad groups in terms of their eating habits, such as babies upto 12 months, children below 2 years and those aged between 2 and 4 years.

The principal food items for babies up to 12 months are branded baby foods, milk, sago, barley and fruits. The feeding practices are more or less uniform; there is no such thing as a principal or supplementary meal. Branded baby foods are in use by babies in households of almost all expenditure levels. However, babies in higher expenditure level households consume more branded baby foods and fruits than their counterparts in lower expenditure levels. Conversely, sago and barley are consumed in larger quantities by babies in lower expenditure level households.

Children between 1 and 2 years of age are almost equally divided into two groups—(a) those who take the same principal and supplementary meals as the adults and (b) those who are kept on uniform feeding (i.e. all meals are of the same type and quantity; it is therefore difficult to identify them as principal and supplementary meals). The principal food items consumed by children between 1 and 2 years of age are milk, rice, chapati, branded baby foods, sago, barley, vegetables, fish, egg, tea, puffed rice, halwa and fruits. Children in higher expenditure level households consume more of milk, fish, egg, biscuits, fruits and branded baby foods, and less of chapati, tea, puffed rice and halwa.

Almost every child aged between 2 and 4 years takes both principal and supplementary meals. The food items constituting the principal meal are rice, chapati, dal, vegetables, fish, egg, milk and fruits. The supplementary food items include chapati, tea, biscuits, puffed rice, bread/loaf, milk, chhana (milk solids), branded baby foods and

fruits. Here again the children in higher expenditure level households consume more milk, fish, egg and fruits and less chapati, dal, vegetables, tea and puffed rice.

The table below gives an idea of the daily consumption of different foods in grammes consumed by young children in three different age-groups:

| Food items | Quantity of foods in grammes (0.0) consumed by children aged | | | |
|------------------------------|--|--------------|--------------|-------|
| | Up to 12 months | 1 to 2 years | 2 to 4 years | All |
| Rice (raw and parboiled) ... | 3.5 | 22.3 | 64.1 | 45.2 |
| Rice (flaked) ... | 0.2 | 0.5 | 1.3 | 1.0 |
| Rice (puffed) ... | 0.2 | 2.4 | 5.2 | 3.8 |
| Wheat/Wheat atta ... | 1.5 | 13.0 | 58.6 | 39.5 |
| Loaf/Bread ... | 1.9 | 5.2 | 14.9 | 10.7 |
| Sago ... | 13.3 | 14.0 | 2.2 | 6.5 |
| Barley ... | 22.6 | 2.3 | 0.6 | 1.2 |
| Biscuits ... | 2.7 | 7.2 | 8.5 | 7.2 |
| Dal ... | 0.8 | 4.5 | 13.2 | 9.4 |
| Milk ... | 181.0 | 250.4 | 206.0 | 210.5 |
| Branded baby food ... | 22.9 | 15.5 | 2.9 | 9.1 |
| Fish ... | 0.4 | 5.1 | 12.8 | 9.1 |
| Meat ... | 0.1 | 1.8 | 4.9 | 3.5 |
| Egg ... | 0.5 | 1.4 | 3.0 | 2.1 |
| Vegetables ... | 1.9 | 12.1 | 32.9 | 23.2 |
| Tea (prepared form) ... | 1.9 | 11.8 | 52.7 | 35.7 |
| Fruits ... | 12.8 | 23.9 | 33.8 | 28.1 |
| Others ... | 11.9 | 15.4 | 33.3 | 26.4 |
| Total ... | 280.1 | 408.8 | 550.9 | 472.2 |

7. NUTRITIONAL VALUE OF DIETS

One of the important elements of the study was to determine the nutritional level of the Calcutta population. To accomplish this the quantities of the different types of foods consumed by each individual member in a household were first calculated. The nutritional contents were worked out with the help of the coefficients obtained for the edible portions of these foods. It was thus possible to determine the nutritional intake of an individual in terms of five important basic nutrients, namely Calories, Protein, Vitamin A, Iron and Calcium.

The Indian Council of Medical Research have recommended certain dietary standards for Indians. These values (recommended by Dr. C. Gopalan) have been reproduced in the Table.

The analysis shows that the average Calcuttan does not get adequate nutrition. The average person consumes about 909 grammes of different foods per day. Nevertheless, over 60% of the population in Calcutta fall below this average food intake level. This majority invariably falls in the lower economic groups—whose total household expenditure level does not exceed Rs. 300 per month.

A closer examination of the data shows that of all the five basic nutrients chosen, calorie deficiency is the most pronounced in the average person's diet in Calcutta. Inadequacy of protein intake is a less acute problem. However, it is generally recognised

that protein fails to fulfil its main role as a body building element until and unless the calorie needs of the body are fully satisfied.

It is of interest to examine the dietary situation in respect of each of the five basic nutrients.

Calories: The study shows that the average Calcuttan in any age group suffers from acute calorie deficiency. For instance, 98% of the children aged

up to 4 years do not get enough calories from everyday food. The diet of 81% of the children is deficient by more than 25% and that of 33% is deficient by more than 50%. Again 92% of the adults get less than 75% of the calories needed and the diet of 7% is deficient by more than 50% of the calorie requirement. The recommended daily intake of calories and the actual intake (as obtained from the survey data) for persons of different ages is given below:

| Age-sex group | | | | Recommended daily intake of calories per person (units) | Actual daily calories intake per person as observed from the survey data (units) |
|----------------------|-----|-----|-----|---|--|
| Less than 6 months | ... | ... | ... | 639 | 172 |
| 6 months to 1 year | ... | ... | ... | 680 | 446 |
| 1— 2 years | ... | ... | ... | 1,200 | 627 |
| 2— 3 years | ... | ... | ... | 1,200 | 788 |
| 3— 4 years | ... | ... | ... | 1,350 | 855 |
| 12—16 years (boy) | ... | ... | ... | 2,500 | 1,446 |
| 12—16 years (girl) | ... | ... | ... | 2,200 | 1,346 |
| 22—56 years (male) | ... | ... | ... | 2,800 | 1,696 |
| 22—56 years (female) | ... | ... | ... | 2,200 | 1,549 |

Daily allowances of nutrients for Indians
(Recommended by the Nutrition Expert Group in 1968)

| Group | Particulars | Net Calories | Proteins (gm) | Calcium (gm) | Iron (mg) | Vitamin A | |
|-------------|--|-----------------|------------------|-----------------|--------------|-----------------------------------|---------|
| | | | | | | Retinol or carotene (i. u.) | (i. u.) |
| (0) | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Men | Sedentary work | 2400 | 55 | 0.4-0.5 | 20 | 750 | 3000 |
| | Moderate work | 2800 | | | | | |
| | Heavy work | 3900 | | | | | |
| Women | Sedentary work | 1900 | 45 | 0.4-0.5 | 30 | 750 | 3000 |
| | Moderate work | 2200 | | | | | |
| | Heavy work | 3000 | | | | | |
| | Pregnancy (second half of pregnancy) | + 300 | + 10 | 1.0 | 40 | 750 | 3000 |
| | Lactation (up to 1 year) | + 700 | + 20 | | 30 | 1150 | 4600 |
| Infants | 0— 6 months | 120/kg | 2.3-1.8/kg | 0.5-0.6 | 1.0 mg/kg | 400 | — |
| | 7—12 months | 100/kg | 1.8-1.5/kg | | | 300 | 1200 |
| Children | 1 year | 1200 | 17 | 0.4-0.5 | 15-20 | 250 | 1000 |
| | 2 years | | 18 | | | | |
| | 3 years | | 20 | | | | |
| | 4— 6 years | 1500 | 22 | 0.4-0.5 | 15-20 | 300 | 1200 |
| | 7— 9 years | 1800 | 33 | | | 400 | 1600 |
| | 10—12 years | 2100 | 41 | | | 600 | 2400 |
| Adolescents | 13—15 years—Boys | 2500 | 55 | 0.6-0.7 | 25 | 750 | 3000 |
| | Girls | 2200 | 50 | | 35 | | |
| | 16—18 years—Boys | 3000 | 60 | 0.5-0.6 | 25 | 750 | 3000 |
| | Girls | 2200 | 50 | | 35 | | |

Source: Table 22 of Dietary Allowances for Indians by C. Gopalan and B. S. Narasinga Rao, Special Report series No. 60, Indian Council of Medical Research.

It will be observed that calorie deficiency in babies aged less than 6 months is particularly critical even assuming the additional intake of 300 units from mother's milk.

Protein: Overall, people are getting the required protein from their diet. Only one-third of the population in Calcutta

—both pre-school children aged up to 4 years and adults—do not get the required quantity of protein from the foods consumed every day. These people invariably fall in the lower economic stratum. The statement below gives an idea of the recommended and actual daily intakes of protein per person:

| Age-sex group | | | | Recommended daily intake of protein per person (grammes) | Actual daily intake of protein per person as observed from the survey data (grammes) |
|----------------------|-----|-----|-----|--|--|
| Less than 6 months | ... | ... | ... | 10.6 | 5.0 |
| 6 months to 1 year | ... | ... | ... | 11.9 | 13.0 |
| 1— 2 years | ... | ... | ... | 17.0 | 18.0 |
| 2— 3 years | ... | ... | ... | 18.0 | 24.0 |
| 3— 4 years | ... | ... | ... | 21.0 | 26.0 |
| 12—16 years (boy) | ... | ... | ... | 53.0 | 46.0 |
| 12—16 years (girl) | ... | ... | ... | 50.0 | 43.0 |
| 22—56 years (male) | ... | ... | ... | 55.0 | 54.0 |
| 22—56 years (female) | ... | ... | ... | 45.0 | 49.0 |

Iron: 98% of the children show deficiency in iron intake. They get 75% or even less than the recommended quantity of iron. Only 2% are deficient by 50% or more of iron content in their foods. The adult population does not seem to have any problem in respect of iron intake.

This apparent adequacy is surprising in view of the oft-repeated qualms about iron deficiencies and anemia in Indian children and adults. Two factors may help explain the apparent discrepancy: (1) a large proportion of the iron comes from wheat and it is known that much of the iron in wheat and other cereals is not readily available for absorption from the digestive tract; and (2) infections with intestinal parasites result in loss of iron via the intestine.

Vitamin A: The survey data reveals that 71% of the pre-school children do not get the required quantity of vitamin A. Again, 92% of the adults are also deficient in vitamin A. With 50% of the pre-school children, all in the low income levels, the deficiency of vitamin A is of the order of 25% or more, and with 15% the deficiency is 50% or more. Adults are a little better-off in vitamin A. 18% are deficient by 25% or more. Only 4% get less than 50% of their recommended level of vitamin A. The recommended and actual intakes of vitamin A can be assessed from the following figures:

| Age-sex group | | | | Recommended daily intake of vitamin A per person (I.U.) | Actual daily intake of vitamin A per person as observed from the survey data (I.U.) |
|----------------------|-----|-----|-----|---|---|
| Less than 6 months | ... | ... | ... | 1,330 | 332 |
| 6 months to 1 year | ... | ... | ... | 1,000 | 755 |
| 1— 2 years | ... | ... | ... | 900 | 857 |
| 2— 3 years | ... | ... | ... | 900 | 902 |
| 3— 4 years | ... | ... | ... | 900 | 968 |
| 12—16 years (boy) | ... | ... | ... | 3,000 | 2,097 |
| 12—16 years (girl) | ... | ... | ... | 3,000 | 2,151 |
| 22—56 years (male) | ... | ... | ... | 3,000 | 2,564 |
| 22—56 years (female) | ... | ... | ... | 3,000 | 2,400 |

The overall consumption of wheat atta works out as 156.1 g/day. At the 11.5 mg/100 g value for iron reported for atta, this would account for 17.4 mg. of iron per person per day. Even at the 4.9 mg/100 g value for whole wheat the daily amount would be 7.7 mg/day. For reasons previously explained, estimates of the iron supplied by wheat products were made on the basis of atta values—i.e. 11.5 mg/100 g. The increased and highly variable iron content of atta compared to whole wheat may be attributed to particles of iron worn from the mill plates during grinding. These are of dubious nutritional value, as metallic iron is poorly utilised unless in particles of micron size.

If the basis for iron calculations had been taken as whole wheat, 4.9 mg/100 g, the iron content of the overall average diet would be decreased from 27 to 17 mg. Women, whose need for iron is recognized to be high, report intakes of wheat/atta/flour as 153, 163 and 195 g/day for 12-16, 17-21, and 22-56 year old females, respectively. To convert values calculated on an atta base to values that would have been obtained on a wheat base, the quantity of wheat consumed (grammes) must be multiplied by the difference in iron content for atta and wheat, and the product subtracted from the reported iron values. When this is done for the three age groups mentioned, intakes drop from 26 to 16 for 12-16 year old females, from 29 to 21 for 17-21 year old females, and from 30 to 17 for the 22-56 year olds, putting all close to or

below the 20 mg/day lower allowance recommended by ICMR. The recommended and actual iron

intakes of individuals in different age groups is shown in the table which follows:

| Age-sex group | | | | Recommended daily intake of iron per person (mg) | Actual daily intake of iron per person as observed from the survey data (mg) |
|--------------------|-----|-----|-----|--|--|
| Less than 6 months | ... | ... | ... | 5.3 | 1.0 |
| 6 months to 1 year | ... | ... | ... | 6.8 | 3.0 |
| 1— 2 years | ... | ... | ... | 18.0 | 5.0 |
| 2— 3 years | ... | ... | ... | 18.0 | 9.0 |
| 3— 4 years | ... | ... | ... | 18.0 | 12.0 |
| 12—16 years (boy) | ... | ... | ... | 25.0 | 28.0 |
| 12—16 years (girl) | ... | ... | ... | 35.0 | 26.0 |
| 22—56 (male) | ... | ... | ... | 20.0 | 33.0 |
| 22—56 (female) | ... | ... | ... | 30.0 | 30.0 |

Calcium: 50% of the children and 32% of the adults in Calcutta are deficient in calcium. Roughly one-third of the children and adults get less than 75% of their calcium requirement. 7% of the children and 18% of the adults do

not get even 50% of what they require. The details are shown in the next table. All the data underline the fact that nutritional inadequacy is more critical among the majority of the population in lower expenditure level households.

| Age-sex group | | | | Recommended daily intake of calcium per person (mg) | Actual daily intake of calcium per person as observed from the survey data (mg) |
|----------------------|-----|-----|-----|---|---|
| Less than 6 months | ... | ... | ... | 550 | 250 |
| 6 months to 1 year | ... | ... | ... | 550 | 581 |
| 1— 2 years | ... | ... | ... | 450 | 592 |
| 2— 3 years | ... | ... | ... | 450 | 550 |
| 3— 4 years | ... | ... | ... | 450 | 466 |
| 12—16 years (boy) | ... | ... | ... | 650 | 489 |
| 12—16 years (girl) | ... | ... | ... | 650 | 465 |
| 22—56 years (male) | ... | ... | ... | 450 | 594 |
| 22—56 years (female) | ... | ... | ... | 450 | 531 |

8. FOOD BUYING HABITS

The information on household food buying habits was obtained in the form of source of purchase, frequency of purchase, price per unit of purchase and the form of purchase—loose or packaged.

Source of purchase

The following Table provides data on the source of purchase. The average Calcuttan buys food items from the same source irrespective of his economic level.

Frequency of purchase

A majority of the households in Calcutta buy milk, fish and bread almost daily. Households in the lower economic levels buy food items more frequently but in lesser quantities. Again, items which can be stored for some time are bought more frequently by the lower income households. Rice being a rationed commodity is often bought in small quantities from outside sources. Milk is bought daily by most of the households. The difference is reflected more in the quantity—the lower income households buy less milk than those in the higher income levels. A majority of the lower income households cannot afford to buy fish daily. Dust tea is more popular among lower income households and is bought more frequently than leaf tea.

Price per unit of purchase

Quite a few food items commonly consumed by Calcuttans suffer from seasonal variation in prices. Generally speaking, August-October prices are

higher than December-January prices. Most of the perishable food items, such as fish, vegetables and fruits are available at a lower price in December-January. These items are by no means plentiful in the summer months of April-June, and prices invariably rise.

Items like fish, vegetables and fruits differ enormously in terms of quality, size, type and freshness. The prices of these products are influenced to a great extent by each of these factors. The lower income level households by and large go in for the cheaper varieties.

Form of purchase

A majority of the food items normally consumed are bought in loose form. The upper income level households show a comparatively greater inclination to buy packaged foods. The only exception is noticed in tea. Packaged tea is patronised more by the lower income level households.

Percentage distribution of consuming households by source of purchase for some selected food items

| Food items | Source of purchase | | | | | | | | | | | | Number of consuming households |
|---------------------------------------|--------------------|--------------|------------------------|--------------|---------------|---------------|-----------------|------------------|----------|-------|--------|-------------|--------------------------------|
| | Fair price shop | Co-operative | Grocer/ Provision shop | Sweets stall | Confectioners | Variety store | Pharmaceuticals | Department store | Pan shop | Bazar | Others | No response | |
| (0) | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| Rice (parboiled) | 76.7 | 0.1 | 4.5 | — | — | — | — | — | — | 12.3 | 6.2 | 0.2 | 2232 |
| Rice (puffed) | 3.4 | 0.2 | 67.5 | — | — | 0.8 | 0.1 | 0.4 | — | 12.7 | 14.3 | 0.6 | 1062 |
| Wheat (atta) | 88.3 | 0.2 | 4.3 | 0.1 | — | — | — | 0.0 | — | 3.9 | 3.0 | 0.2 | 1770 |
| Wheat (flour) | 92.1 | — | 4.6 | 0.3 | — | 0.3 | — | — | — | 0.9 | 1.2 | 0.6 | 330 |
| Barley | 2.1 | 1.0 | 79.0 | — | 5.3 | 6.3 | 1.0 | — | — | 3.2 | — | 2.1 | 95 |
| Sago | 2.9 | 0.5 | 90.4 | 0.5 | 0.5 | 1.4 | — | — | — | 3.8 | — | — | 208 |
| Bread | 4.8 | 1.7 | 38.1 | 0.4 | 18.4 | 19.9 | 0.1 | 0.7 | 2.2 | 5.7 | 7.7 | 0.3 | 1324 |
| Lentil | 1.4 | 0.7 | 97.1 | 0.1 | — | — | — | 0.1 | — | 0.2 | 0.4 | 0.0 | 1842 |
| Cow milk (khatal/ milkman) | 0.1 | — | 0.2 | 0.1 | — | — | — | — | — | 0.2 | 0.9 | 98.5 | 1136 |
| Cow milk (standard, Cal. milk supply) | 1.3 | 0.3 | — | — | — | — | — | 0.3 | — | — | 1.0 | 97.1 | 311 |
| Tea (leaf) | 0.1 | 4.0 | 42.9 | 0.1 | 5.0 | 18.2 | — | 8.5 | 0.3 | 6.3 | 13.7 | 0.9 | 884 |
| Tea (dust) | 0.5 | 2.3 | 56.6 | 0.6 | 4.3 | 11.2 | — | 4.9 | 0.5 | 3.2 | 12.8 | 3.1 | 965 |
| Rohu (fish) | 0.3 | — | 0.1 | — | — | — | — | — | — | 99.0 | 0.2 | 0.4 | 789 |
| Mustard oil | 0.7 | 1.0 | 87.7 | 0.1 | — | 0.1 | — | 0.6 | — | 8.6 | 1.2 | — | 2262 |
| Vanaspati | 0.4 | 1.5 | 89.0 | 0.2 | — | 0.8 | — | 0.3 | — | 7.0 | 0.7 | 0.1 | 887 |
| Onion (small) | 0.2 | — | 5.4 | — | — | — | — | — | — | 94.3 | 0.1 | — | 1250 |
| Potato | 0.1 | 0.0 | 3.3 | — | — | 0.0 | — | — | — | 96.3 | 0.1 | 0.2 | 2347 |
| Brinjal | — | — | 0.4 | — | — | 0.1 | — | — | — | 99.1 | 0.3 | 0.1 | 1518 |
| Perwar | 0.1 | 0.2 | 1.0 | — | — | — | — | — | — | 98.1 | 0.6 | — | 1347 |
| Biscuit (thin arrow-root) | 0.2 | 2.2 | 43.5 | — | 15.1 | 28.0 | — | 0.3 | 0.5 | 5.4 | 3.3 | 1.5 | 1062 |
| Sweet (chhana) | — | 0.3 | 0.6 | 91.4 | 0.9 | 0.3 | — | — | 0.8 | 2.0 | 1.7 | 2.0 | 349 |
| Cumin seed | 0.0 | 0.8 | 94.3 | — | — | 0.1 | — | — | — | 4.0 | 0.5 | 0.3 | 2080 |
| Turmeric | 0.1 | 0.7 | 88.9 | — | — | 0.2 | — | — | — | 9.2 | 0.5 | 0.4 | 2311 |

All the data underline the fact that nutritional inadequacy is more critical among the majority of the population in lower expenditure level households.

9. ATTITUDES OF HOUSEWIVES

Overall disposition towards foods

Calcutta housewives, by and large, are not satisfied with the foods normally consumed in their homes. The proportion of dissatisfied housewives is greater among lower expenditure level households. This applies equally to households with or without pre-school children. Housewives belonging to upper expenditure levels are much less dissatisfied with the foods consumed in their households. And, of course, the foods consumed in the upper expenditure level households have greater nutritional value.

Preference for foods for different people

If the housewife could afford them, she would buy more health-giving foods for her children as well as for the adults in the home. Nearly 90% of the housewives at all expenditure levels would like to get additional quantities of milk for their babies and children. The other foods which come spontaneously to mind among housewives as better foods for babies are rice, branded baby foods, fruits, biscuits, fish, sago and barley. The proportion of housewives naming fruits and baby foods is greater among households in the higher expenditure levels.

The housewives thought that grown-up children should get more rice, milk, fish, meat, egg, vegetables, dal, chapati and fruits. The proportion of house-

wives showing preference for fruits and egg increases with a rise in the expenditure level of households.

A majority of the housewives would like to serve more rice and fish to adult members. The other items mentioned by them for adult members in the home are meat, egg, chapati, dal, milk and fruits. The preference for milk and fruits as adult foods increases with a rise in the expenditure level of households.

Housewives' preference for various foods is influenced by their feeling that these foods will help maintain the good health of all members of the household. This is uniformly true of all housewives irrespective of the expenditure level of the household.

Attitudes towards different types of foods

Housewives were asked to give their verdict on some statements relating to different forms and types of foods. Their responses were recorded in terms of three alternatives, namely (a) "agree fully", (b) "agree partly", or (c) "don't agree at all", with the statements.

Fresh foods, packaged baby foods and milk are preferred by housewives for baby feeding. Milk, meat and fish are considered extremely important for growing children. Some housewives consider milk to be indispensable.

Although more expensive, packaged foods are considered good for children's health, and housewives would welcome reasonably-priced

packaged foods. However, packaged foods would seem to be less popular amongst vegetarians.

The figures below show the proportion of housewives who agree fully with the different statements on various forms and types of foods:

| | Housewives having pre- school children in the home | Housewives who do not have pre- school children in the home |
|---|---|--|
| | Percentages | |
| Good housewives always prefer fresh foods for their babies | 97 | 97 |
| Good housewives always welcome new baby foods | 36 | 28 |
| Packaged baby foods are good for children's health | 56 | 51 |
| Packaged baby foods are always fresh | 41 | 36 |
| There is nothing like fresh milk for babies | 88 | 89 |
| Vegetarian foods are always better for children than non-vegetarian foods | 42 | 46 |
| Milk is always better than meat and fish for children | 75 | 76 |
| Milk, meat and fish are equally important for children | 58 | 57 |
| Children prefer packaged foods to fresh foods | 44 | 41 |
| Some baby foods are better than fresh milk | 34 | 32 |
| Adults should take more meat and fish and less milk | 75 | 77 |
| Fresh foods are always better than packaged foods | 77 | 79 |
| Only lazy housewives go in for packaged foods | 31 | 36 |
| Packaged foods are frequently adulterated | 38 | 39 |
| Packaged foods are rather expensive | 63 | 61 |
| Good housewives would welcome reasonably priced packaged foods | 56 | 52 |

Awareness of different nutrients in foods

A majority of the housewives are unfamiliar with the terms protein, carbohydrate, calorie, mineral or fat. However, 64% of the housewives are

aware of the word vitamin and 56% know its correct meaning. Next in order of awareness occurs protein. The level of awareness is relatively higher among upper expenditure level households.

Given below is the proportion of housewives who are aware of the different nutrients i.e. they were able to put their understanding of these nutrients in words:

| | House- wives who are aware | House- wives who un- derstand the meaning |
|---------------------|-------------------------------------|--|
| | Percentages | |
| Calorie | 11 | 6 |
| Carbohydrate | 8 | 3 |
| Fat | 22 | 19 |
| Mineral | 8 | 4 |
| Protein | 32 | 24 |
| Vitamin | 64 | 56 |

Preference for foods for pre-school children

Housewives were exposed to a list of 30 selected food items and asked to indicate their preference for these foods as well as their impressions about the likes and dislikes of children with respect to these food items. Salient features of the housewives' preference for these food items and the likes and dislikes of children were as follows:

- Chhatu (de-husked Bengal gram flour), maize and soyabean are not liked at all.
- Mothers do not consider groundnut, salted snacks and tea to be good foods for their children, but the children like them.
- Biscuits, bread, butter, chhana (milk solids), maida (finely ground wheat flour), milk, pulses, rice and vegetables are liked by both mothers and children. There is no noticeable variation in attitudes between households in different income levels.
- Canned baby foods, curd, chira (parboiled rice soaked in water and then flaked), egg, fish, meat, fruits, muri (puffed rice), sooji (broken barley) and wheat atta are liked by both mothers and children of all expenditure levels.
- For barley, khai (parched paddy) and lozenges, toffee, candy etc. there is a high degree of liking among both mothers and children, but the degree of liking decreases as per capita expenditure increases.

A further appraisal of the data in terms of the age breakups of the pre-school children shows the disposition of the housewives towards each of the 30 selected food items to be as follows:

Barley: Good for babies in the age group six months to one year, but not so much for older children. Vegetarian housewives do not like to give barley to their children.
Biscuits: Good for every pre-school child, particularly for the older ones.

Bread: Not good for babies under one year of age. Good for babies aged up to two years along with milk. Good for older children in many forms, such as untoasted/toasted, with butter, milk, etc.

Butter: Good for children aged over 12 months, but not for younger ones.

Canned baby food: Good for babies aged up to two years.

Curd: Good for children aged between two and four years, but not for younger ones.

Chhana: Good for children aged over 12 months.

Chhatu: Not suitable for any pre-school children.

Chira: Good for children aged over 12 months, preferably with milk and sugar. In fried form suitable only for pre-school children aged over two years.

Cornflakes: Not suitable for pre-school children.

Eggs: Not suitable for babies aged up to 12 months. Good for older children, preferably poached or half-boiled.

Fish: Not suitable for babies up to 12 months. Upper expenditure level housewives would like to feed fish soup or stew to babies aged 6-12 months. Good for pre-school children aged 2-4 years in any form.

Fruits: Good for all pre-school children.

Groundnut: Not suitable for any pre-school children.

Khai (parched paddy): Good for pre-school children either fresh or mixed with milk. Lower expenditure level housewives show greater preference for khai than upper expenditure level housewives.

Lozenges/Toffee/Candy: Not suitable for babies aged up to 12 months. Lower expenditure level housewives are more favourably disposed towards these items than those in upper expenditure levels.

Maida (fine-ground wheat flour): Good for pre-school children aged 2-4 years, but not for younger ones.

Maize: Not suitable for pre-school children.

Meat: Good for children aged over 12 months in the form of soup or stew. Not preferred for younger ones.

Milk: Good for all pre-school children.

Muri: Good for children aged over 12 months.

Oat porridge: Not suitable for pre-school children. The level of awareness of this item is rather low.

Pulses: Good for children aged over 12 months.

Rice: Good for all pre-school children aged six months and more.

Salted snacks: Not liked for pre-school children.

Sooji (broken barley): Preferred for children over 12 months.

Soyabean: Not liked for any pre-school children. The level of awareness among housewives is rather low.

Tea: Not liked by housewives for pre-school children, though children aged 2-4 years like it.

Vegetables: Considered good for babies aged 6-12 months in the form of soup or stew. For pre-school children aged over 12 months in other forms.

Wheat atta: Not liked for babies up to 12 months, though considered good for children over 12 months.

Flavour additives

Flavour as a concept is a bit foreign to the majority of housewives, particularly those in the lower expenditure levels. This is a possible reason why housewives, by and large, are apathetic towards flavour additives in foods. However, those housewives who can comprehend the concept would accept the flavour of ghee, banana, onion, cardamom and bay leaf in some foods.

Disposition towards canned baby foods

A majority of the housewives are favourably disposed towards canned baby foods as a quality food for children aged up to two years. However, nearly 50% of the housewives consider canned baby foods too expensive.

Marketing feasibility of new baby foods

A majority of the housewives feel that any new baby food which is reasonably priced would be quite popular among all economic classes. 76% of the housewives who have pre-school children in the home and 70% of those who do not express this feeling.

Uncooked versus ready-to-eat baby foods

Over 60% of the housewives irrespective of their expenditure levels would prefer baby foods which do not require any cooking.

Decision makers on baby foods

Opinions of the mother, doctor and father in that order influence the choice of foods for babies.

Measuring equipment used for baby feeding

Most housewives make use of spoons or cups for measuring foods for baby feeding. Nearly 30% depend on guesswork to determine the quantity of food to be fed. Feeding bottles and a special type of spoon (jhinook) are also used for feeding weaning babies.

Attitude towards new baby foods

A majority of the housewives showed concern about the health of babies, and are ready to accept any new baby food which would be good for their babies. Most housewives rely heavily on the doctors' advice in selecting baby foods. Moreover, housewives are aware and apprehensive of the dangers of adulteration and would like to make sure that the baby food they buy is pure. Another important feature influencing the choice of a new baby food is that it should be filling. The secondary considerations for selecting a new baby food are: 'the child likes it', 'the food is easy to prepare', and 'neighbours give it to their babies'.

3.2 Proposals for the promotion of Special Muri, a low-cost, nutritionally-fortified food, among residents of the Calcutta Municipal Corporation area

by Mr. Subhas Ghosal
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These proposals stem directly from the Calcutta Food Habits Study and are designed to reach, and communicate the offer of a new product to the residents of the Calcutta Municipal Corporation area. The proposals are by no means final; but they do indicate the kind of effort that is possible and also suggest what kind of money needs to be spent to tackle the problem of under-nutrition in a limited area.

The Situation

Some important findings of the Food Habits Study:

Calcutta's population is 3.1 million. The Study shows that of these 3.1 million only 1 million have any income at all, and over 80% of this 1 million earn less than Rs. 500 per month.

The average household in Calcutta consists of 6 persons and the average expenditure per household on food is Rs. 300 per month i.e. Rs. 1.58 per day per head. For the lowest 20% in this group, the food expenditure is less than a rupee a day.

The average diet is deficient both in calories and nutrition. 98% of pre-school children are also deficient in Iron. There is no alarming deficiency in protein but protein by itself cannot do its work without adequate calorie intake.

So the ideal product in this situation would be one that is inexpensive, nutritious, and acceptable in taste.

A muri (puffed rice) type product has been developed. It is a close approxi-

mation to muri in taste—which makes it highly acceptable in Calcutta; it is enriched with protein, vitamins and minerals—nutritionally fortified; and it should be marketable to consumers at Rs. 3 per kg which is the price of medium-grade muri in Calcutta.

Acceptability of muri

Muri is a widely accepted product in Bengal. In Calcutta, 45% of all households consume muri regularly at the average rate of 1.9 kg per person per year. Depending on quality, the price of muri to the consumer varies between Rs. 2.50 and Rs. 4.00 per kg. 17% (45,000) of Calcutta's pre-school children eat muri every day and poorer children eat relatively more of it. Significantly, women who eat less of everything, eat more muri than their menfolk. It is no less important that women do not consider it extravagant to eat muri in quantities that they would never have done were it more expensive. Here is a crucial advantage that this kind of a new product may have in gaining entry into Calcutta households.

By and large, muri is eaten as a supplementary snack in the mornings and afternoons. For many children muri is a breakfast food and is also eaten at tiffin-time.

The Product

It is suggested that the new muri-type product be named Special Muri. This name will keep the connection with muri and yet distinguish the product as superior; besides, checks carried

out amongst people in various income groups indicate that, overall, the name Special Muri would convey the superiority of the product and be easily remembered. Also, in checks amongst middle and low income groups, 'Special Muri' got the highest rating among a list of names suggested for the product.

Special Muri, manufactured by the extrusion puffing process, is similar to conventional muri but is nutritionally fortified with 10% defatted soya flour plus vitamins and minerals. Special muri is well ahead of conventional muri in vitamins, mineral content and protein enrichment. In the event that the procurement of soya flour continues to be a problem, groundnut flour may be used although the protein content of groundnut flour is not as high.

Conventional muri comes to Calcutta from four major outlying supply sources and is supplied by wholesalers to retailers in gunny bags lined with polyethylene. On an average, the procurement price paid by wholesalers is Rs. 2.10 per kg and the ultimate selling price to the consumer is, again on an average, Rs. 3 per kg after the product has gone through the stages in the distribution chain — from wholesalers to sub-wholesalers to small retailers and vendor to finally the consumer. It seems obvious that the wholesaler-to-retailer network should be used for Special Muri, slipping it into the distribution stream at the wholesaler level. The ex-factory price for Special Muri has been calculated at Rs. 2.30 per kg which

would be the price charged to the wholesaler.

The acceptability test carried out for Special Muri produced very encouraging results. Almost all income groups were contacted and a fairly large sample covered. All the respondents tried the product. 80% liked it, in varying degree—from 'a little' to 'very much'; 60% were ready to accept it as a substitute for conventional muri.

The current market for conventional muri is 6000 tonnes a year. Taking into account all the factors in favour of Special Muri and given uninterrupted supply, it should be possible for the product to acquire a 25% share of the market.

At this point of time, although the product is available, there is no manufacturer and certainly no one to act as the marketer and advertiser. However, in order to formulate promotional plans for Special Muri, it is necessary to set a few basic objectives and state the important criteria in planning—factors that arise logically from the findings of the Calcutta Food Habits Study, the problem at hand and the observations which have just been made.

Marketing Objectives

Very simply stated, these are:

- (i) To make available Special Muri to the low-income sections of the population
- (ii) To distribute Special Muri through

the present network for conventional muri

- (iii) To achieve 25% share of the conventional muri market during the first year
- (iv) To promote Special Muri basically to replace conventional muri.

Target Audience

Primary Group:

All households with food-expenditure levels of Rs. 300 per month and below. Especially women but also the principal wage-earner.

Secondary Group:

Doctors, employers of large work forces, school authorities, every educated person.

Communications Objectives

Primary Group:

- (i) Create instant and widespread awareness of the ready availability of Special Muri
- (ii) Register its low cost and acceptable taste
- (iii) Motivate trial at the target audience level.

Secondary Group:

- (i) Disseminate information about Special Muri as a nutritive food amongst all secondary groups, i.e. doctors, employers, school authorities and in fact every educated person
- (ii) Seek their help to motivate trial by undernourished individuals.

Consumer Proposition

Primary Group:

Here's a new type of muri containing all the goodness of extra vitamins and protein

Special Muri tastes good, does good and costs no more than ordinary muri. It is also readily available.

Secondary Group:

Malnutrition is more widespread than you thought. But the incidence is highest amongst people who look to you for guidance. You can help by getting them to eat Special Muri.

Media Objectives

- (i) Make everyone residing in the Calcutta Municipal Corporation area familiar with the name, price and availability of Special Muri
- (ii) Direct the message about the goodness of Special Muri at the primary target group
- (iii) Maintain a high exposure and noise level for as long as possible
- (iv) Limit expenditure to approximately Rs. 3,00,000.

Media Strategy

- (i) Use media offering localised coverage and sustained exposure
- (ii) Use primary/persuasive media only to secure coverage of primary target group
- (iii) Dominate each medium for period used

- (iv) Terminate advertising six months after launch.

Media Plan

It is strongly felt that because Special Muri is so good and so acceptable it will rapidly become a part of the dietary pattern of the target population. It will not be necessary to advertise the product beyond the initial six months period after the launch, by which time it would sell, as with conventional muri, by itself.

Two media plans are suggested. Plan 'A' is a conventional, well-rounded plan and the coverage obtained through a limited media-mix would be very satisfactory. The cost of putting this plan into action could be tailored to the sanctioned appropriation of Rs. 3,00,000 with only marginal sacrifice of impact.

The alternative—Plan 'B'—would in fact generate greater immediate excitement. The target audience is approached on a much wider front, at points of purchase and on the streets where he or she is most likely to be. The only drawback to this plan is that it does not include press advertising—the primary persuasive media for the target audience. More than in the case of Plan 'A' it is difficult to hazard any quantification of coverage which will be achieved by Plan 'B'. However, it would be safe to assume that only a remarkably retarded citizen would remain oblivious to the existence, availability and virtues of Special Muri.

Here also the cost is easily reduced to the limit of Rs. 3,00,000.

Media Plan 'A' - Activities

| | Months 1 2 3 4 5 6 |
|--|-----------------------|
| Press— 4 newspapers 12 insertions | _____ |
| Radio—One 30-second spot twice daily | _____ |
| Outdoor—10 buses 10 hoardings | _____ |
| Point of purchase 2 posters (120,000) Shopsign (5,000) | _____ |

Media Plan 'A' - Coverage

| | |
|--|---------------------------------------|
| Press | 1 million, 12 times |
| Radio | $\frac{1}{2}$ million, 364 times |
| Outdoor (Buses, hoardings, posters) | 1 $\frac{1}{2}$ million, 182 times |

Media Plan 'A' - Cost

| | |
|-------------------|----------------------|
| Press | 1,44,000 |
| Radio | 46,000 |
| Bus | 22,000 |
| Hoardings | 50,000 |
| Point of purchase | 50,000 |
| | <hr/> 3,12,000 <hr/> |

Media Plan 'B'—Activities

| | Months 1 2 3 4 5 6 |
|------------------------------------|-----------------------|
| Leaflets—1 million | _____ |
| Radio—Two 30-second spots daily | _____ |
| Posters—2 designs 120,000 | _____ |
| Hoardings—20 | _____ |
| Shopsigns—5000 | _____ |
| Matchbox labels— 7.2 million | _____ |
| Booths—20 | _____ |
| Pushcarts—100 | _____ |
| Paper bags—1 million | _____ |

Media Plan 'B'—Coverage

Practically saturation coverage possible.

Media Plan 'B'—Cost

| | Rs. |
|-----------------|----------------------|
| Leaflets | 30,000 |
| Radio | 25,000 |
| Posters | 30,000 |
| Hoardings | 1,05,000 |
| Shopsigns | 20,000 |
| Matchbox labels | 43,000 |
| Booths | 20,000 |
| Pushcarts | 15,000 |
| Paper bags | 22,000 |
| | <hr/> 3,10,000 <hr/> |

3.3 Discussion on the Food Habits

Survey presentations

The Survey

Various aspects of the survey findings were discussed. The quantity of *cereals* consumed in each household had been estimated at 342 grams per head per day on an average. This seemed to be on the low side, perhaps because it did not include rice from sources other than ration shops, which certain other studies had shown to be quite considerable. It was clarified that in the present survey, the average consumption was based on actual household consumptions. An estimate was possible of the quantity of non-rationed cereals derived from other sources which are eaten in statutory rationing areas such as the Calcutta municipal area, since the quantities of cereals issued under the ration was known, as well as the actuals consumed. Such computation had shown that about 76% of the rice consumed on an average was derived via the ration shop, and 24% from elsewhere. In calculating nutritional status, naturally the total actual consumption had been employed.

In earlier surveys in Maharashtra and Gujarat carried out by the Protein Foods Association, parallel deficiencies had been found both in respect of calories and of proteins, whereas the present findings in Calcutta appeared to show that the deficiency was mainly or entirely in respect of calories. Was this because of the non-vegetarian habits of almost the entire Calcutta population, or was it because the protein consumption had not been corrected for quality? It was pointed

out that correcting for the quality of single protein components in mixed diets was not a sound procedure and hence total uncorrected protein figures had been recorded. However it had been found in other nutritional studies that the net protein utilisation in ordinary total diets in Calcutta was usually about 65; if the total protein intakes recorded were corrected by this factor, there would be distinct deficiencies of protein, but still not as great as the magnitude of calorie deficiencies.

Of the 45 or so essential nutrients in a balanced diet, only a few had been computed in the present survey. This did not mean to suggest that the others were present in sufficient supply. On the advice of nutrition experts in the country, it was decided even when the survey was planned to focus on a few *critical major nutrients* rather than on a very large number of minor ones. Dietary alterations to correct for the former would probably automatically take care of shortfalls in other minor nutrients.

Some items were eaten only once every few days, for example, a piece of fish once in 3 days. Would not such sporadic consumption affect the calculation of *daily nutrient intakes*? It was pointed out that the survey had in fact been deliberately spread over a period of time so that such habits would even out; likewise the object of carrying out the survey during different seasons was to obviate any seasonal bias.

Several queries related to *food choices* and *food quality*. Thus it would have been of interest to determine the consumer reaction to the quality of the new high-yielding rice varieties, like IR-8, for consumption both as boiled rice, and in the form of products like puffed rice and parboiled rice. In regard to fish also, there were numerous varieties to choose from: was the customer's choice based on availability, varietal preference or price? Similarly, what of pulses, of which again a large number are available? Nutritionally also these choices could be relevant. It was pointed out that some of this information was available in the detailed tabular consumer data as recorded. In regard to attitudes, only about 30 selected food items and not all had been picked out for preference questioning in greater depth, as stated in the report.

In the nutritional and economic backdrop of Calcutta city, as reflected in the survey, the major question that arose was whether more calories could be furnished for the same outlay of money that is now spent. A processed food certainly added convenience, but should be viewed also in terms of what nutrients it could deliver. It appeared that, in terms of calories, only the availability and eating of more basic foods would really provide the solution, and this again depend on the raising of incomes. These aspects were beyond the scope of the workshop, which was confined to a part of the total system, viz. nutritious manufactured foods. The present task therefore would be to examine how foods could be devised

so as to give *maximum benefit* at any particular cost. Obviously all nutrients could not possibly be provided in every single packaged food; in other words, within the constraints of manufacturing costs, could something be done for the totality of nutrition and what economic strata could one hope to reach? No solution or product should be rejected unless an even better solution could be offered.

Special Muri

Special Muri, which had been presented as a possible product concept, was also *actually manufactured* in an extruder. The product could therefore be seen, felt and tasted by those present. It was pointed out that, because of limitations of time and cost, this product represented just one run on the extruder. Many variations were possible in formulation, ingredients (rice, wheat, jowar, bajra, ragi), cooking time and external appearance. Even rejected rice, broken rice and less desirable types of rice could all be used. In regard to calories, there was little difference between this product and ordinary muri; protein content was higher because of the incorporation of defatted soya flour. The incorporation of fat, either by using whole soyabeans or full-fat soya flour, or by frying the product in or spraying it with oil, would significantly raise the calorie level and perhaps improve the taste and acceptability. In place of soya products, groundnut products could also very well be used. Additions of needed vitamins (e.g. vitamin A) and

minerals (iron, calcium) were possible during manufacture. The relevant question was to see how many calories were now supplied through consumption of ordinary muri and what difference the new Special Muri could hope to make in practice. Nutrition was related to hygiene and infection, and the handling of ordinary muri was a case in point; large-scale manufacture and packaging would ensure that a cleaner food reached the consumer.

Regarding the *stability* of the built-in nutrients, there was of course no question of protein deterioration. Vitamin A too was quite stable in muri, as it was in bread, in which the time and temperature of heating were both more drastic. Surprisingly, and for reasons unknown, fat in extruded products was considerably more stable to rancidity than in many products of similar fat content. Of course studies on the keeping quality of Special Muri would need to be carried out.

What about the *acceptability* of Special Muri? Today some 60 per cent of all families liked and ate muri. It might be relevant that the soyabean was not an acceptable food product in India. Doubts were expressed whether in fact an extruder product, however good, would really substitute for a food as traditional as muri with a texture and taste so deeply entrenched by habit. A rice eater was very discriminating in respect of taste, and would be averse to buying anything to which he was not accustomed.

Synthetic rice, when launched by CFTRI, Mysore many years ago, had won poor acceptance, and Special Muri might well become branded as simply a synthetic muri. However actual acceptability of the extruded soya-fortified product had been excellent among those who did not know what it contained. The product had a tendency to go soft on exposure, but could be crisped again with slight heating.

The *cost and pricing* of Special Muri received considerable attention. In the presentation a cost of Rs. 3/kg. had been suggested, based on a 33 per cent throughput and a price of Rs. 2/kg. for the raw materials. Much would depend, apart from raw material costs, on the volume and efficiency of production on an extruder; this aspect, it was stated, had been dealt with in the working group report of an extruded product in the later Snack Food Session. However, even taking rice at 90 p a kg, it was doubtful if the cost could ever go lower than Rs. 3 per kg. because of the very high cost of the machine, on which depreciation alone would be considerable. Moreover the promotion cost of Rs. 3 lakhs, on an annual production of 1500 tonnes of the product, would come to 11-55 paise depending on the period over which it was spread.

On the other hand, people were of course buying muri now at Rs. 3/kg., and if nutritional improvement at the same price using modern technology was possible, the product was to be welcomed. This would be even more

so if the product could be made from broken rice as had been claimed. A lot of such broken rice was now produced during rice milling, and while some was eaten, most of it was diverted for use as an industrial raw material or in cattlefeed. Perhaps it was only when rice supplies were really plentiful that a large-scale rice-based product could hope to become feasible.

The *sociological implications* of commercial production of muri were brought up, since planning for better foods could not be divorced from employment opportunities. Both in the rural and urban areas, especially the former, large numbers of people were employed whole-time in muri manufacture, which was one of the few occupations open to them.

Displacement of such labour through an industrial operation had however to be viewed in a bigger context: was this a greater evil or was malnutrition? It really was a matter of priorities, and these were admittedly not always easy to determine in instances such as the present where people eked out a small living by such occupation. From another angle, could not effort rather be directed to improving in some fashion the present procedure for making muri so as to give a better product? In consequence, total muri production might well go up, and this could be a more desirable end-result than the present objective of replacing part of the existing muri market with a machine-made product.

Another means for delivering better nutrition might be to encourage

consumption of puffed rice along with boiled or roasted Bengal gram. This was the practice in South India, and it was nutritionally sound since a useful protein *supplementation effect* occurred. All that would be required was to encourage present muri manufacturers to also make the gram component. One practical approach suggested was that instead of looking for new entrepreneurs, the present bigger muri manufacturers should be given the know-how and working capital on loan to go into manufacture of Special Muri so as to prove or disprove its viability.

Arguments had been advanced, during the presentation of the concept, for not using *brand names*. If this position were accepted, the first manufacturer would run the gamut of promotion, and the next would reap the benefit: as a result, no one was likely to risk going into production unless he did in fact protect his interest with a brand name.

Further Surveys

Considering the great value of the present survey, a strong plea was entered for *similar surveys* in the rural areas of Bengal. Surveys in other cities and regions of the country would also be of enormous value to nutritionists, planners and food manufacturers.

3.4 Why a Marketing Workshop?

by Dr. K. T. Achaya
Protein Foods Association of India

We are all in debt to Mr. Chitta Mitra and Mr. Subhas Ghosal for describing in such graphic terms the Calcutta scene in its relation to diet and food. What we had was more than a few static snapshots showing the views from various angles. Rather would one liken it to a documentary film, moving in more senses than one, the scenario for which is the pulsating city in which we now meet.

Yet what avail such data in themselves? Knowing more and more, even about more and more, can be a pretty sterile exercise. From knowledge must spring action, and in this belief lies the genesis of the Calcutta Workshop. The Protein Foods Association of India, whose work is supported by the leading food and allied industries of the country, was called upon to organise a marketing workshop at which the food habits data from Calcutta could be studied, analysed and translated into terms of consumer foods. The Governing Board of the Association readily agreed, since, as an organisation devoted to the promotion of better food and better nutrition, PFAI was well fitted to carry out this role. Nor was it a stranger to this particular form of activity. In December 1969, it had organised in Delhi the first marketing workshop based on a comprehensive food habits survey of Gujarat and Maharashtra states. The report of the Delhi workshop reflects the earnest attempt made by several working groups to develop concepts for marketable nutritious foods in the three areas of fortification, special foods and new processed foods. Who knows but that

some government measures, such as the fortification of atta with protein, vitamins and minerals, or some commercial manufactured products which have appeared since then, did not owe at least some of their Inspiration to the momentum generated by the Delhi Workshop? Though based on a regional food survey, it was in effect the first national marketing exercise.

What can marketing workshops do and hope to do? It is important that we attempt an answer as a buttress to mere faith. The ground plan is undoubtedly the information gathered on food tastes, preferences and usage forms, on diet in relation to income and education, and on strongly held attitudes, taboos and beliefs. All these you have just heard described. A great deal of information has been gathered about the Calcutta resident, the foods he buys and eats, how much of it he can afford, what he likes and would like to have more of and, just as important, what he is not getting.

Carefully examined, these data offer guideposts to the next step—the identification of opportunity areas which a potential manufacturer can hope to enter. New food products do not spring, like Minerva, fully blown; they stand a better chance of success if based on consumer needs and consumer habits, especially so in a food-traditional country like India. For example, a food which is traditionally home-made might offer the possibility of large-sale manufacture, with the added benefit of nutritional

upgrading and convenience. In our country, with its overwhelming poverty, these opportunity areas must recognise this first important constraint: low cost becomes almost the paramount consideration. With the large nutritional gaps which have just been pointed out, it also becomes imperative to build vital nutrients into the products suggested — not necessarily all of them, but at least those which are most needed and are appropriate to the food.

Once identified, even the opportunity areas do not really mean much in themselves in terms of food. What is required is to determine what products, or at least product profiles, would be possible within the areas. To ensure this exercise being given the care and thought which it calls for, it was resolved when organising the present Workshop to entrust it to four groups of experts, working in the four opportunity areas of staples, snack foods, beverages and infant foods. This is merely a division of convenience, in which even overlaps could occur, e.g. a beverage could well be an infant food or a snack food. These four teams consisted of people with expertise in diverse fields including science and technology, product development, technical management, packaging, marketing and promotion, market research and government policy. Each group was balanced with as many such hues of experience as was possible.

For the last two months, these teams have sifted the data, wrestled with product possibilities, given thought to target groups, consumer potential

and costing, gone into production constraints, packaging and shelf life, considered strategies for product promotion, and in some instances suggested the appropriate agency for production: private industry and at what level, milk boards, government enterprise, or consortiums of the pooled talents of both. Not all these inputs have of course been possible for every product concept. The suggested products range from those which simply appear to offer attractive possibilities which deserve further consideration to others for which it has been possible to recommend an almost fully developed market strategy. For the special case of staple foods, a number of seemingly viable measures for nutritional upgrading have been put forward. These group reports have been in your hands well ahead of this workshop.

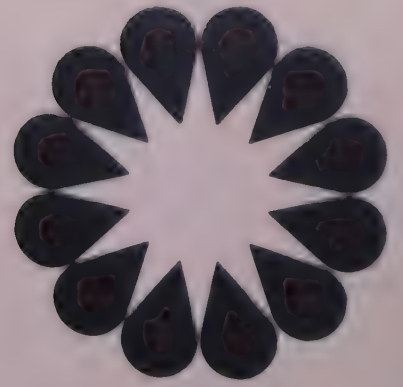
From this point on, how do we proceed? At the ensuing four sessions, the Chairman and some members of each working group will first make a presentation of the apparently viable product possibilities which they have wrested from the data. Thereafter the entire working group will take the dais, and for the rest of the session will act as a kind of think tank, with the Chairman exercising his skills of moderation. From all of you assembled here we shall expect, not just questions and doubts on what has been described, though these will of course be welcome, but further thoughts for yet other product possibilities, suggestions for removing constraints even on products which now exist, possibilities

for innovative joint enterprises between industry and government—in fact, thoughts on any of the myriad aspects of food development, promotion, marketing and policy which might lead to the emergence of more nutritive foods for everybody, young and old, rich and poor, cityman and suburban dweller. Let the four sessions to come be utilised for exercises in productivity.

At the final session tomorrow afternoon, the Chairmen of the four working groups will constitute themselves into a panel under a group leader. They will sum up the total inputs that have gone into the working sessions, bring out common problems and constraints and suggest the kinds of follow-up action which seem desirable and appropriate.

A workshop cannot produce food. It can engender ideas for better foods, and the more potentially viable these ideas are, the better. One such concept has already been described by Mr. Ghosal. To translate an idea into a food which reaches the customer is the ultimate objective. If this were to happen even to a few of the many thoughts and ideas developed here, the time of all of us, organisers and participants alike, will have been well spent.

May I thank the Chairmen and each member of every working group for the enormous time and trouble which they have put in? It would for once be perfectly true to say that without their efforts, this workshop would not have been possible. To the others, our thanks for coming and may you have a fruitful sojourn here.



Chapter IV:

Staples

4. STAPLES

4.1 Working Group Report: "Staple foods as vehicles for better nutrition".

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A. Enrichment of staples

Introduction

The Calcutta Food Habit Survey has revealed in the first instance an overall calorie shortage in the diets of people. There are supplementary deficiencies of protein, vitamins and minerals.

The problem of calorie deficiency is obviously a prior one particularly in the lower income groups where calorie shortage is 64%. The individual

spending power of this segment of the population is less than Rs. 20 per month. A solution to their needs is obviously not within commercial feasibility but is one of basic economic upliftment of the population. There is however a large segment of the population who are above the per capita expenditure level of Rs. 20 and approximately 60% of their expenditure is on foods. Their calorie deficiencies are less acute. These segments can be approached commercially and in a manner that could reduce their nutritional intake gaps.

The Calcutta study brings out among others the following facts:

- (a) The principal meals of the day include rice, chapati, dal, vegetables etc., so much so that over 80% of the Calcutta households consume these items at least once a day.
- (b) Tea is another item which is consumed in quantity by nearly 95% of the households.
- (c) The average Calcuttan consumes about 909 grammes of different foods per day. 61% of the population get only 750 grammes of foods per day per person. This quantity does not provide adequate nutrition.
- (d) Out of the 750 grammes of the daily intake of foods by an individual comprising this 61% of the population, 540 grammes are accounted for by cereals,

pulses and vegetables. In other words, 70% of the quantity intake of foods for the more vulnerable group of the population consists of cereals, pulses and vegetables.

- (e) Pre-school children aged upto 4 years also consume considerable quantities of cereals, pulses and vegetables.

All this underlines the fact that the common man's staple foods, such as rice, chapati, dal, vegetable curry and tea, are his main source of nutrition. He cannot be expected to afford sophisticated and more expensive nutritious foods.

Any efforts at inroads, in terms of a substitution or supplementation approach, will have to be made without affecting the overall food habits, tastes and preferences of the population. Amending food habits or creating new ones, especially at the lower economic levels, will be extremely difficult. Thus nutritive staple foods will have to be developed which are close to and can substitute for common food dishes.

The survey findings indicate that rice, chapati, dal, vegetable curry and tea are the most common food dishes, irrespective of economic classes:

| | Percentage of households where it is served at least once a day |
|-----------------|---|
| Rice | 94 |
| Chapati | 92 |
| Dal | 85 |
| Vegetable curry | 81 |
| Tea | 94 |

Hence any attempt to enrich staples nutritionally should focus on these dishes.

Alternatives for nutritionally improving staple items of the diet

The following considerations could be evaluated for nutritionally improving staples.

(a) Rice

The average daily consumption of rice in Calcutta is approximately 500 tons. The consumption of rice is highest (131 tons) in the PCE group Rs. 20-40, and lowest (43 tons) in the PCE group below Rs. 20. In the other PCE groups, the consumption is uniform and lies in the region of 100-110 tons every day.

Parboiled rice is nutritionally superior, but some people consider this variety aesthetically inferior to polished rice. The principal reason for its lack of popularity is its flavour. Flavour improvement of parboiled rice to make it more acceptable is an alternative worth considering.

Utilisation of a semi-parboiling process, the technology for which needs to be

developed, might improve the acceptability of parboiled rice to the habitual raw rice eater. Further, through an improved process of parboiling, the nutritive quality of parboiled rice could be improved. Flavour incorporation could be another feasible proposition. A flavour resembling that of basmati is known to have been developed abroad.

Fortification of rice grain with nutrients:

A feasibility study was conducted to evaluate rice grain fortification. It was found technologically feasible to produce fortified rice. However, the cooking practice widely employed in domestic kitchens in India consists of boiling the rice in an excess of water and draining the excess water at the end of boiling. The nutrient incorporated in rice was found to pass into the excess water during boiling and thus gets discarded along with it.

This difficulty can be overcome through an improved process of enriching the rice known as the 'premix method'. The enriched rice is blended with ordinary white rice in the ratio of 1:200. The loss of vitamins from enriched rice during washing and cooking is very low and ranges between 7% and 12%. By combining organic solvents as soaking media and water-insoluble derivatives as enrichment ingredients, the loss of vitamins in enriched rice during washing and cooking can be almost completely eliminated.

The possibility of seeding rice with synthetic rice-shaped grains containing

nutrients may be another way of coping with the problem. The synthetic grain could be so made that boiling has no effect on nutrient leaching.

Cooking habits may tend to change if a fortified 'minute rice', viz. pre-cooked enriched rice, is introduced in India. This rice is fortified and pre-cooked in controlled conditions and sold to the consumers as such. All that is required is to add a measured quantity of boiling water whereby the rice grains assume the shape of boiled rice. This 'minute rice' would obviate the possibility of nutrient leaching since no excess water is discarded.

From a marketing point of view, the concept of an enriched pre-cooked rice would again be better as this would be a convenient food.

(b) Chapati

On any given day of the year, Calcuttans consume approximately 500 tons of chapati made from wheat. The consumption is again highest, as in the case of rice, in the PCE group Rs. 20-40 and lowest in the bottom PCE group. In the other PCE groups the consumption is in the region of 100 tons a day.

Chapati is made from wheat atta. Atta is obtained from wheat which is

- (i) either bought whole from shops and then ground in chakkis, or
- (ii) bought readymade from roller flour mills.

Roller mills in Bombay and some in Calcutta are fortifying the atta produced by them under a Government of India project with proteins, vitamins and minerals. When the consumer buys whole wheat for domestic grinding, there is no possibility of its being fortified. Hence it is essential that more atta is made available to the consumer from roller flour mills so that the benefits of fortified atta can be distributed over a larger segment of the consumers.

A study should be initiated to determine the following:

- (i) What percentage of the States' atta consumption originates from roller mills?
- (ii) Has this percentage been increasing over the years?
- (iii) Is there any consumer resistance?
- (iv) Can the atta made by roller flour mills be made more popular among consumers?

Steps should be taken to make atta fortification by roller flour mills mandatory by law. Before doing so, the infrastructure for such a programme needs to be carefully worked out. Government machinery can be effectively utilised in this regard.

(c) *Dal*

Approximately 150 tons of dal is consumed by Calcutta's population everyday. The consumption pattern is exactly similar to that of rice and chapati. The PCE group Rs. 20-40 consumes the highest quantity, the

PCE group below Rs. 20 the least, and the other groups uniformly in the middle-range.

The consumption of dal in the country is decreasing owing to a reduced supply. Dal is the main source of protein in the Indian diet. This production should therefore be increased. The following two production possibilities could be examined:

- (i) Pre-cooked dal (in the same manner as minute rice), which can be fortified with vitamins and minerals at the time of pre-cooking.
- (ii) The use of extrusion technology to produce pre-cooked dals from raw materials such as defatted oilseed flours. This will tend to utilise hitherto unutilised food raw materials and extend the supply of dals by the manufacture of desirable foods in the shape of dals in which balanced nutrients can be incorporated.

(d) *Vegetable curry*

The only way of improving nutrient intake through this staple is to identify the more popular spices and flavouring materials, such as common salt, and then examine the feasibility of fortifying the latter with appropriate nutrients. The daily consumption of vegetables in Calcutta is approximately 450 tons. Assuming that approximately 1% salt is added on the weight of vegetables, the consumption of salt through vegetable curry will be

approximately 4-5 tons. The feasibility of fortifying common salt with iron and calcium is already under investigation.

Oleoresins are flavour extracts from spices, and the technology to produce them has been developed by CFTRI. The use of nutritionally-enriched oleoresins in place of spices is thus a possibility worth considering. Apart from the nutritional benefit emerging from this, the possibility of adulteration which is believed to be widespread in the spices trade, could be reduced through packaging, labelling and manufacturer identification.

(e) *Tea*

Tea is the only beverage which offers itself for consideration as a staple food. Two possibilities exist for nutritional improvement of tea:

- (i) Fortification of dust tea with vitamin A. Technical feasibility has already been established. Commercial feasibility needs to be examined.
- (ii) Development of a tea whitener for use as milk substitute. Both technical and commercial feasibility need examination. The benefits would arise from an increased supply of milk through capture from its present use as a tea whitener to child and infant feeding. The estimated annual Indian milk consumption is 22 million tonnes, of which at least 5 million tonnes is consumed for tea and coffee whitening.

(f) *Other foods*

(i) *Bread*: Bread is consumed every day by 38% of the Calcutta households, a somewhat lower percentage by the lower-income groups and a higher one by the higher-income groups. Some breads are already fortified. A much wider programme could be achieved by fortifying all the flour made in roller flour mills so that all products made from it are automatically fortified. Examples of such products, and their percentage consumption by different households, are:

| | Percentage households |
|----------------|-----------------------|
| Bread | 38 |
| Biscuits | 38 |
| Sweets (maida) | 13 |
| Luchi | 6 |
| Paratha | 9 |
| Kachori | 4 |
| Singara | 4 |

(ii) *Indian snacks made from maida*: Indian snacks made from maida are a popular food particularly in lower income households. Most of these are made in the small-scale sector. Of the 2.5 million tonnes of maida produced in the country, only about 400,000 tonnes are consumed by the organised baking industry, the rest going to the small-scale sector (halwais etc.). If the basic raw material for such popular foods is fortified (technical feasibility has already been established), the nutritional impact could be substantial. The possibility of

mandatory fortification of all flours produced by roller flour mills in the country needs to be examined since its potential benefits are obvious.

B. Restructuring Tax Levies on a Nutritional Basis

The group would also like to propose, from an overall view, certain suggestions to the Government. If implemented, these might act as incentives to the processing industry in producing and marketing low-cost nutritious foods.

1. A considerable proportion of the incremental costs of food products results from the effects of various government and local body levies. Excise duties and sales taxes on certain industrial raw materials and packaging materials, octroi duties, higher freight charges for finished foods products, excise duties and sales tax on finished food products—all these add to the direct cost of the food product to the consumer. If such cost-inflating levies could be drawn back for such products as meet certain minimum nutritional standards, they would tend to lower the price to consumers and thus fall within the reach of larger segments of the low-income groups. Nutritional benefits would also accrue.

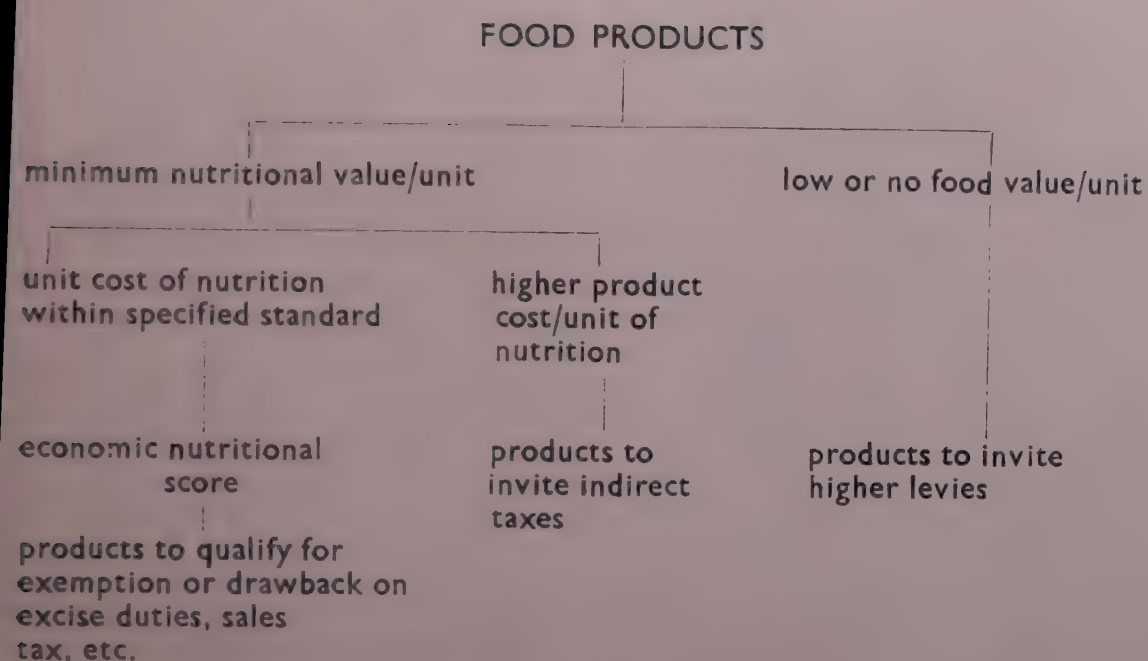
The following suggestions could be considered:

(a) A definition must be established as to what constitutes a low-cost nutritious food product. Such a definition has to take into view the cost of raw materials, packaging materials, processing

and marketing, and the prices of equivalent natural foods. This definition could establish an upper limit to the cost per unit of nutrition.

(b) All products falling within this Economic Nutritional Score should qualify the manufacturer to obtain a drawback on the cumulative excise duties, if any, and sales tax on industrial raw materials and packaging materials, freight costs and octrois, and a drawback also on excise and sales tax on the finished product. In turn this drawback would be passed on to the consumer thereby lowering the cost to him of such products.

This would cause a loss to Government of some revenues, but such loss could be offset to some extent by increased levies on products which far exceed the standards of the Economic Nutritional Score. Perhaps food products with low food values could attract even higher levies. The classification of products and the modification of indirect levies now suggested are represented in the diagram given on page 59:



This system of modified levies would tend to reduce the price of nutritionally desirable food products, and thus bring them within easier reach of lower-income consumers. Products with poor food value will tend to be within the reach only of the highest income level consumers, but in this bracket nutritionally better foods are consumed anyway. As for Government revenues, this proposal if implemented would shift the application of levies from all foods to those foods which could yield a higher revenue per unit of food item. Thus the plan proposed need not necessarily mean a loss of revenue.

2. The commercial production of food products with a high economic nutritional score (ENS) needs to be and can be stimulated with financial incentives. A company which has a substantial turnover derived from sales of ENS food products might be

encouraged to do so by a reduction in income tax rates applicable to that company. For instance, if the income tax applicable to a company is 55% of gross income, then for every 1% of its turnover derived from ENS food products, it might be given a rebate of $\frac{1}{4}\%$ in its income tax. If a company derives 100% of its turnover from the sale of ENS food products, it might be entitled to a rebate of 25% in income tax and instead of paying 55% tax on gross profits, it would be paying only 30% tax. It is understood however that ENS products, being low-priced, would also yield lower profits to the manufacturer. A reduction in tax level may not necessarily increase net profits, nor does it necessarily mean a loss to the exchequer in the form of lower tax. If it does increase net profits to the manufacturer, it is an incentive to industry to earn higher net profits by diversifying a larger percentage of its

turnover to ENS products, and thus in simultaneously benefiting both the consumer and its own operations.

C. The Need for a Model for Institutional Feeding

As has been brought out by the survey, 10% of Calcutta's population have a monthly PCE of less than Rs. 20/-. A large part of their diet comes from staples. Even this fails to provide them with enough calories, and the deficiency is estimated at 64%. These groups are unlikely to respond to normal commercial marketing because of their limited economic resources. Even enriched staple foods would not meet their calorie deficiencies.

The plausible alternative to improving their nutritional status will thus have to be either subsidised foods or, particularly in the case of children, institutional feeding. The prime needs of institutional feeding are:

- (a) Funds
- (b) Nutritious foods at as low a cost as possible
- (c) Co-ordinated activity of all organisations involved in such feeding.

There has been some experience in the country in running feeding programmes in which resources, both financial and management, have been pooled both by the State and by voluntary organisations. These efforts have not been entirely satisfactory or free from continuing erratic performance. In view of the long-term needs of institutional feeding, there is

an acute need to develop a model feeding programme which will involve the building up of an infrastructure that could be duplicated all over the country. The Calcutta study has been able to outline the foods that could be used in such programmes and its precise scope of operation.

It is recommended that the various organisations, such as the State Government, industry and voluntary institutions, carefully set up, for the Calcutta region, a model institution feeding programme that would take into account the extent of funds, foods and skills that could be made available on a continuing basis. Such a set-up would need to be nursed, watched and amended before as pragmatic a model as possible is evolved for duplication all over the country. The operations of such a set-up, it is recognised, would be different for urban and rural segments of the country's population.

4.2 Considerations arising from the Working Group Presentation and Report on Staples

A. *Fortification of Staples:* The very wide reach of staples fitted then pre-eminently for consideration as fortification vehicles. The percentage expenditure on food varied from 69 per cent to 42 per cent in families with a *per capita* expenditure of Rs. 20 to Rs. 100 (Figure 3). In these same segments, cereals and pulses accounted for 53 per cent to 29 per cent of the expenditure (Figure 4). Various possibilities in respect of rice, wheat, dhal, vegetable curry, tea, bread and maida-based foods were spelled out by the Group. A case was made out for using nutrition as a basis in fixing differential taxes and levies. A plea was made to develop models for institutional feeding programmes, which had assumed so much nutritional importance in the country.

B. *Salt fortification:* A strong case was made out to consider salt as a staple to be fortified. No single food item was as ubiquitous: it was the most socialistic ingredient in the diet! Daily consumption was almost steady. Nor was salt ever in short supply, even in countries in which it was not made. It was not subject to losses by storage or waste. Production being controlled by Government, implementation of fortification measures was feasible economically and administratively.

Fortification with Iron and calcium had been most carefully examined, but other nutrients could also be added. Ferrous sulphate is well absorbed, and

additives had been devised to reduce its tendency to discolour, with an accompanying reduction in bio-availability. The chemistry, technology and biological utilisation had all been examined. Uneven particle size and varying moisture content needed to be overcome. A 5 per cent moisture limit would permit easy dry-grinding of the ingredient with salt, and this technique was superior to co-crystallisation. Implementation of salt fortification would require the installation of equipment for coarse grinding and continuous mixing at selected centres of salt production, training of personnel, quality control, continuous nutritional evaluation and ultimate fortification of all the 3 million tonnes of salt now consumed for edible purposes in India.

C. *Some issues relevant to the upgrading of Staples*

1. At present, there is voluntary and limited fortification of resultant atta with proteins, vitamins and minerals in operation in a few cities. What would be the problems of mandatory fortification?

2. Would any of the present food laws or regulations be violated if fortification were instituted? What modifications would be called for, e.g. in Prevention of Food Adulteration Rules, or ISI standards for atta, maida, besan etc.?

3. What technical difficulties would arise in fortifying non-powdered products like rice, bajra, jowar, tea,

etc.? What has been the experience in fortification of these staples elsewhere in the world?

4. What would be the cheapest form of packaging fortified staples in 1, 5 and 25 kg. packings?

5. Will special unit packs, e.g. a pink package for all fortified products, help instant identification and possible purchase?

6. Fortified staples will require promotion. What types of promotion would be most effective: point-of-sale, radio, cinema? How can the cost be met?

4.3 Discussion on Staples

To fill the *calorie gap* was obviously the major priority. To use fat was one possibility, but this being expensive, it was necessary to fall back on cereals as energy sources. It was felt that fortification of rice grains involved a change in the present habit of washing rice, which would be very difficult to achieve. Hand-cleaning of rice involved the danger of removing the premix since this had a different shade. Perhaps rice could be fortified just by adding dhal to it. Potatoes and sweet potatoes could also be considered as fairly cheap sources of calories. For fortifying vegetable curry, use of a manufactured product, oleoresins, in place of ordinary spices and condiments offered the possibility of fortification. In regard to *protein*, a one-to-one mixture of besan and expeller soya flour was actually being marketed as a high protein powder at the same price as

besan itself; it also provided a substantial proportion of calories through the fat present.

Fortification of wheat with ferrous sulphate was known to cause discolouration of the chapattis made with it. In salt, use of a complexing agent with the ferrous sulphate was effective in preventing discolouration during four months of storage. A query arose as to why *salt fortification* had not been implemented. Apparently the earlier approach, of adding the nutrients during evaporation and crystallisation, had not been found feasible in a number of field tests. Since then a dry mixing procedure had been tested out with success, and thereafter recommended for adoption as a national programme.

An opinion was expressed that of all the possibilities suggested in the working group report, the most attractive appeared to be the *fortification of atta*, since this was the cheapest cereal product available. Since flour mills follow a differential price structure in marketing various wheat products, there was room, even under government price controls, for further pricing adjustments designed to benefit the really needy. Whatever industry had done so far was at Government instigation; it was time it showed its own active concern.

A case was entered for promotion of *bulgur wheat*. This is parboiled wheat, and it can be made by mills which now parboil rice. The nutrients were at twice the levels in rice, and wheat

was in good supply in Calcutta. Bulgur wheat tasted good, kept well, was cheap and could be broken into grits and cooked just like rice. Since the wheat and rice seasons were different, employment would be available to rice mill workers during slack periods. It was argued however that the diet pattern in Calcutta was that of one rice meal and one wheat meal, and if bulgur wheat had to find a place, it was by breaking into the rice meal, which appeared unlikely. Indeed the only advantage of bulgur appeared to be in affording off-season employment. The technology was not difficult, but an investment of about Rs. 50,000 for a sealing machine was required by each mill if bulgur was to be made, and the product now sold at a higher price than rice and at only slightly less than semolina. Bulgur had been produced by a few mills in West Bengal, but had not been a commercial success and perhaps the commercial viability needed to be vigorously established with extra inputs like promotion before the technique could hope to be more commonly adopted.

Could *wheat germ* have importance as a food item? It was rich in protein, fat, and a number of vitamins (B12, B6 and E). Not many flour mills today had the means to separate wheat germ from the bran. If they could do so, the product was certainly of nutritional interest. One drawback to be noted was quick development of rancidity.

The Calcutta survey showed that existing dietary deficiencies were very closely related to *income*. In other

words there was simply no buying capacity and the only immediate possibility of nutritional improvement of the vast majority was through *mass feeding programmes*. At present, all over the country, 25 million pre-school children aged from 2½ to 6 years were being fed every day at thousands of centres. Even at each centre the number fed was very large. It was clearly important to strengthen these programmes in every way. Models for production of food and their distribution would be required, since the logistics were formidable. There was a strong nutritional case for also including even younger infants, but how were they to be reached? The feeding programmes should be a matter of concern to all those present, whether from Government, industry, technology or nutrition.

FIGURE 3

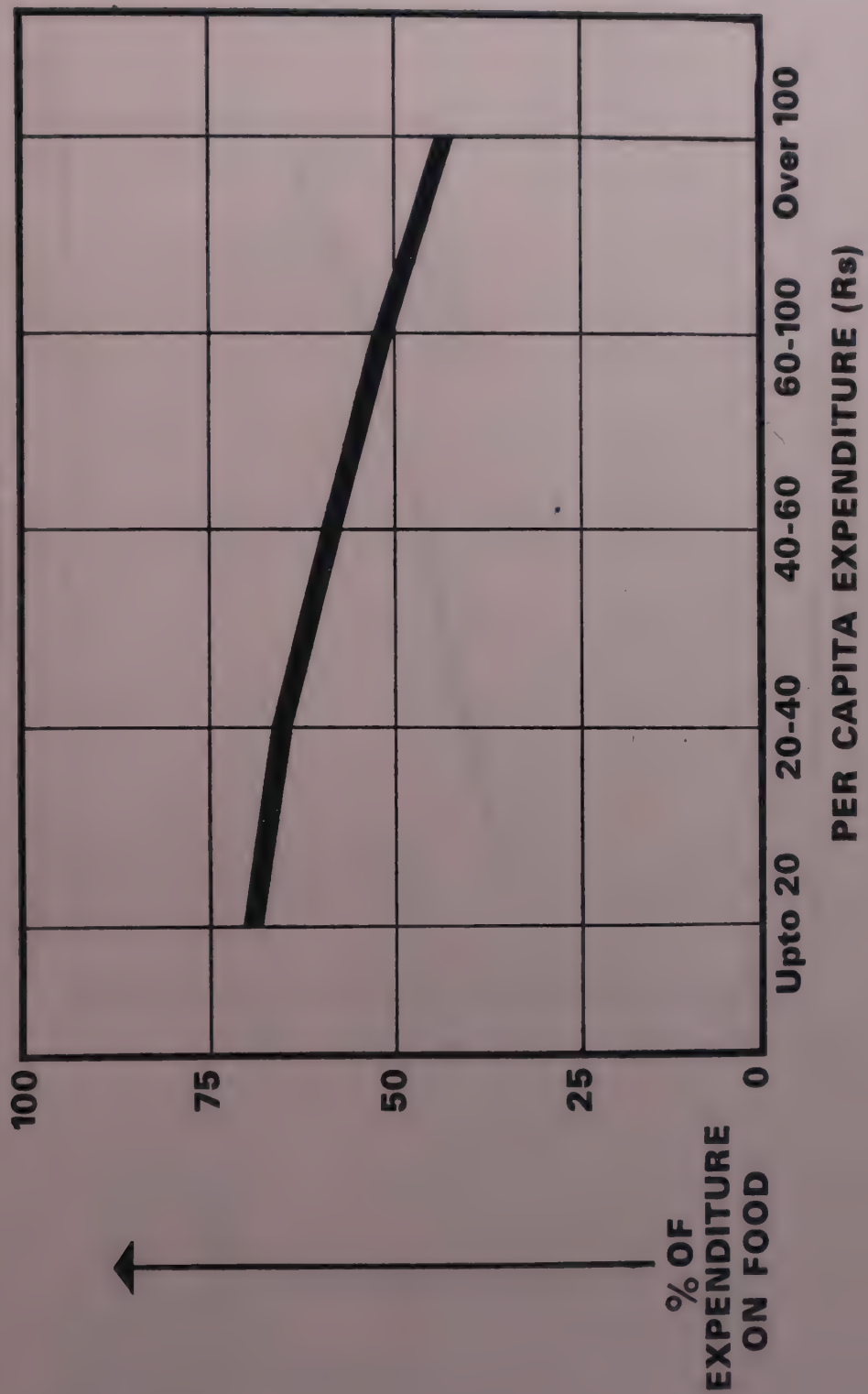
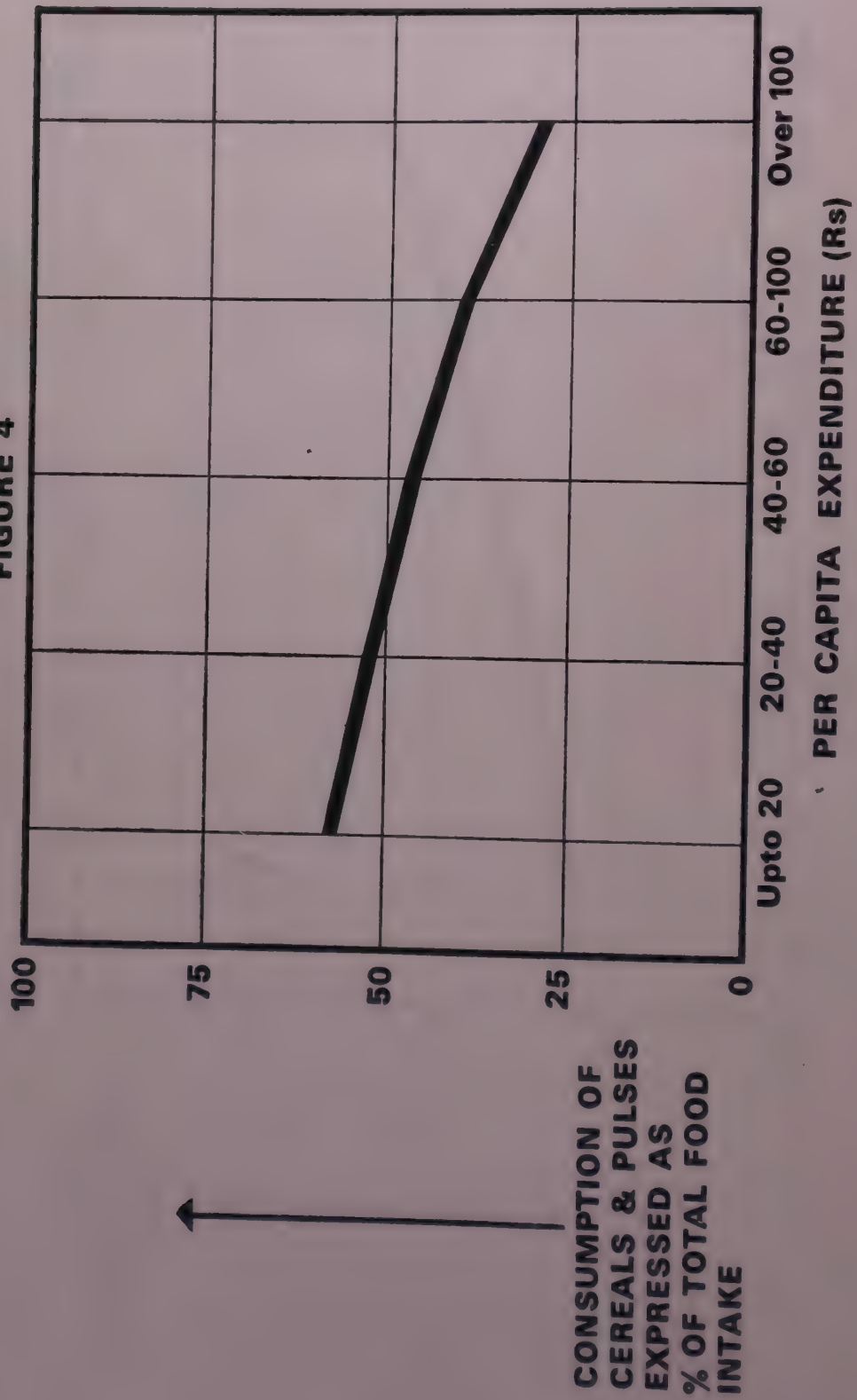


FIGURE 4





Chapter V:

Snack Foods

5. SNACK FOODS

5.1 Working Group Report: "Nutritious snack foods"

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Raj K. Chauhan, Parle Products,
Bombay

E. Fernandes, TOMCO, Bombay

R. K. Lal, Britannia Biscuit Co.,
Bombay

A. V. Mody, UNICHEM, Bombay

Robert W. Nave, Soya Production &
Research Association, Bareilly

A. K. Pal, Voltas, Bombay

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Introduction

The Calcutta Food Habits Survey reveals a fairly significant deficiency in calorie intake in all the lower income groups, whether considered by age or by sex. Though the protein deficiency does not in itself seem to be so serious, in the context of a significant calorie deficiency, even the available protein is likely to be used up in lieu of calories rather than in serving its own special functions. There are also

shortfalls in intake of nutrients like vitamin A and calcium.

The survey reveals that on an average 50% of the household expenditure is already being spent on food. This percentage is as high as 69% at the lowest economic levels. In other words, there is little scope for the Calcutta population to increase its expenditure on food. For better nutrition of the people, either their total income should rise, or some inexpensive but nutritiously rich and acceptable food should be made available to them.

The first alternative is beyond the scope of this workshop. Our endeavour therefore should be to provide low-cost nutritious foods within the reach of as large a section as possible of the population.

Why Snack Foods

The Survey indicates that as much as 71% of the Calcutta population has at least two supplementary meals a day. A significant portion of these supplementary meals consists of snack items like bread, muri, sweets, etc., all of which involve some commercial processing. This provides an opportunity to enrich them with nutrients like vitamin A and calcium.

The Survey also shows that about 26% of the population, a majority of whom would belong to the productive sectors of the economy and fall in the age group of 17-56 years, eat some food outside their homes. Again a fairly significant amount of these foods

are likely to be processed foods of the type mentioned earlier.

With these considerations in view, several possibilities for low-cost snack foods which may reasonably be expected to find acceptance by the Calcutta population were considered.

Which Snack Foods?

Going over the various food items consumed by the Calcutta population, we find among other items the following:

| Food item | % people consuming |
|------------------------|--------------------|
| Bread (including buns) | 38 |
| Puffed rice | 23 |
| Bananas | 13 |
| Chutney | 6 |

Further, the popularity of the four items mentioned is fairly uniform throughout all the income levels. Guided by these considerations, a few specific product concepts were identified and are described in this report.

Once a product concept has emerged, there are associated questions concerned with marketing the product in terms of appropriate and least-cost packaging, distribution and sales promotion. Attempts were also made to provide some thoughts on these marketing concepts.

Cost and Nutritional Considerations

Let us summarise the guidelines before we go on to the individual concepts.

As mentioned earlier, a Snack Food is defined as an item of food which is not expected to replace the main meal. With regard to low cost, a food giving 300 calories and carrying 8-10 gms. of protein should be designed to cost around 18 paise. This figure does not include the costs of distribution and administration incurred during the marketing of the product. In other words ingredients, manufacturing and packing costs of the food should preferably be around 18 paise. With regard to nutrition, this should not imply just calories and protein, but also alleviation of other deficiencies, like those of vitamins A and D, minerals like calcium and iron, etc.

While developing some of the product concepts, a wider spectrum of consumers, not necessarily the lowest income group, have also been considered, bearing in mind that nutrition deficiencies exist even in middle and upper income groups.

While selecting the product concepts, the group was aware that some of the products may be handled either by the organised sector, the small-scale sector or both.

It is hoped that both Government and industry will further follow up the products now to be described either for school feeding programmes or for commercial marketing.

Product 1: Soft Buns

Justification

The Calcutta Food Habits Survey reveals that there is a distinct preference for soft buns as opposed to the hard-variety. Further soft buns should lend themselves extremely well for catering to the mass school-feeding programmes, since they constitute a ready-made food which can go well with a cup of milk or tea, or for that matter with spreads like chutney, etc. The weight of the buns marketed today by a number of large and medium scale bakeries varies from 70 to 100 gms. for the small buns and from 115 to 130 gms. for the large buns. The consumer price varies from 25p. to 50p. each. The preferred flavours in the region are broadly those of mustard oil and ghee. The second lot of preferences are for cardamom, rose and lemon.

With this background, and taking into consideration the product parameters outlined earlier, it is suggested that there is the possibility for two types of soft buns: Sweet Buns and Masala Buns. The distinct features of the proposed Soft Sweet Buns will be that they will be sweet, higher in protein content and enriched with vitamins and minerals, and therefore distinctly better than the ordinary Buns that are at present marketed in Calcutta city and suburbs.

Product Concept

To achieve the additional nutritional qualities, it is proposed that the wheat flour is fortified with soya flour by

about 20% to obtain the desired protein level. Soya flour can be replaced by an equivalent quantity of groundnut flour fully or partly. Similarly, protein isolates or even individual amino acids may be included to any desired degree in the ingredient mix to enhance the protein level; incidentally this will also result in an improved flavour. The limiting factors for these additions will be the costs as well as the taste, flavour and texture of the final product. The cost of about 2 kg. of groundnut flour is about one-third the cost of 1 kg. of protein isolate. It may be mentioned that the protein efficiency ratio (PER) will be increased substantially by the addition of soya flour to wheat flour in the finished product. Incorporation of calcium by the addition of calcium carbonate in the mix is a possibility.

In order to control costs, attention has also been paid to the sugar content in the Buns. At the present extremely high cost of sugar, use of other comparatively cheaper sweeteners was desirable. Khandsari and jaggery were considered. Substitution of sugar by jaggery will to some extent not only reduce costs but also impart a distinct sweet jaggery flavour to the buns. There is no possibility of using synthetic sweeteners since these are banned by the food laws of the country. Milk flavour is also generally favoured in Calcutta, but the high cost of milk products in the country limits their use in this type of product.

Thus the ingredients of the product as finally conceived are 80 parts of wheat

flour, 20 parts of soya flour, 12 parts of sugar, 9 parts of jaggery, 6 parts of vegetable fat, 1 part of compressed yeast, 3/4 part of salt and 55 parts of water, with the addition of perhaps one-third the daily requirements of other vitamins and nutrients like vitamin A and calcium. Buns are made with a finished weight of 100 gms. with a calorific value of around 300, and each containing 11 gms. of protein.

Manufacture and Distribution

This product will lend itself to *manufacture* either on a small scale, a medium scale or a large scale. The mixers are available locally but suitable dividers and moulders are not available for large scale manufacture. They could of course be developed by interested parties through existing manufacturers of bakery equipment in India.

Imported Bun-making machinery is being used by plant bakeries and the divider and moulder will cost around Rs. 50,000/-. This will supplement the existing capacities of the plant bakeries. In other words, with an additional investment of about Rs. 50,000/-, existing plant bakeries will be able to produce every day a lakh buns of 100 gms. each. For a new independent project, the level of investment will be around Rs. 1½ lakhs for manufacturing equipment to produce 60,000 buns per day.

The *packaging* of buns for quick mass distribution may not present problems. Bundle packing of about 30 buns or so in a printed alkathene bag of suitable gauge will be convenient for delivery

through vans. Individual packing of buns is not a commercially feasible proposition.

The mode of *distribution* has to be gone into with care since the buns lose their softness in about 96 hours from the time of manufacture. Approved anti-staling agents may be used in the recipe, but nevertheless it is important that distribution is completed in the shortest possible time.

Quick and regular distribution in mass feeding programmes by some organised agencies will to a great degree ensure that the product reaches the consumer in a fresh condition. If the product is distributed through commercial channels, careful control has to be exercised at the retailing point.

With the above ingredient mix, the final product will provide the additional nutrition required to fill the existing gap. The cost of ingredients, manufacturing and packing will be around 25 paise.

Variation

The other variation is a Masala Bun. Incorporation of mustard oil may create off-flavour problems. On the other hand, an acceptable spicy flavour like 'garam masala' with a predominant tang of mustard may prove popular in the Calcutta region. This is only a suggestion which requires further experimentation and testing.

Promotion

It is important that due emphasis be given to promotion of the product.

As a matter of fact, promotion is a part and parcel of product development, though this is not appreciated fully in all quarters. Equally, one may come across spectacular advertisement with a number of claims which the product may not satisfy. However, it is essential even in a developing economy, that proper inputs be made if a new product is to succeed. It is in this context that it becomes essential to remove the general antipathy towards promotion of new food products. Government as well as other social bodies connected with the school feeding, nutrition and other programmes must appreciate that an optimum amount of promotion is necessary to keep the product established in the market. It is instructive that a number of good products have failed to get established soon after the free distribution phase is over.

The soft sweet bun which has been described has several legitimate advantages on which to base its promotion: it is a sweet, wholesome, ready-to-serve snack, hygienically made and packed, better in taste than the buns that are available in the market, and nutritionally superior in that it provides calories, protein and nutrients at a comparatively low price to the consumer.

Product 2: Enriched, Extruded, Puffed Products

Introduction

Development of low-cost nutritious foods in various forms should be welcomed by all sections of society. The working group has kept in mind the detailed study of the food habits of people in the Calcutta area as a basis for this workshop. Various factors like income levels, eating habits, etc. have been taken into account.

Snack foods manufactured using an extrusion process could be popular low-cost items. It is gathered that around 1 million tonnes/year of Puffed Rice (Muri) is consumed in India. It is made by puffing specially-prepared rice on hot sand, a handful at a time. Muri is purchased by wholesalers from groups of manufacturers in 35 kg. gunny bags and distributed to sub-wholesalers and retailers, ultimately reaching the consumer as a loose, measured-out commodity.

Since ordinary Muri, which is mostly starch, is so popular among the poorer sections of the people, the group feels that a product in puffed form ought to have an excellent appeal. By using the extrusion process, the starch can be fortified with proteins and extruded in shapes similar to Muri. Present outlets can be made use of to reach the masses and achieve our objective. Fortification will not only improve the flavour, but also will furnish extra protein to the consumer. It is possible in the extrusion process

to change the base to corn grits or broken rice, which are normally not used at present for the manufacture of Muri or Puffed Rice.

Extrusion Cooking

What extrusion cooking is

Continuous extrusion cooking is a comparatively new method in the field of food processing, being just over a decade old. Meal, flours, mashes, starches, etc. are used in the extrusion machine with great success.

These are formulated with the intention that the product should on expansion have a close cell structure.

Raw materials can be coloured and flavoured in the machine prior to extrusion or after the extruded product has been dried to around 2-3% moisture in an oven.

Moisture in the form of water or steam is needed for expanding the starch granules. This moisture must reach an optimum level to expand each starch cell evenly. Moisture is added in the form of water to the formula prior to extrusion, or in the form of steam before the product enters the extrusion screw.

The product is then extruded through a die. The type of die depends on the shape and size of the product required. Die thickness governs product heat, pressure and size of cell structure.

Any size and shape can be obtained by change of die, retention time and screw configuration. The ingenuity and

imagination of the person processing the product will be the deciding factor in regard to additional sizes and shapes of the product.

Length of extruder barrel governs retention time of the material before its appearance at the die face, to be cut off by a rotating cutting device. The time for which the material is subjected to heat and pressure is important. Excessive heat or pressure will cause improper cooking and affect quality, texture, etc. Pressures in the extruder barrel depend on the orifices, effective holes in the die, number of holes, rate of feed and kind and quality of material.

Due to the presence of live steam, pressure, heat and moisture, salmonella and harmful bacteria are killed.

Advantages of extrusion cooking

- (1) The extruder is a very versatile unit and many raw materials and their combinations can be processed without difficulty.
- (2) It is a highly sanitary operation and it involves minimum handling during processing.
- (3) Salmonella and harmful bacteria are destroyed during processing.
- (4) The product is rendered very light due to puffing and can be easily digested.
- (5) Shapes of the product can be changed and they can also be coloured for eye appeal.
- (6) Shelf life of extruded foods is

quite long as they contain low moisture.

- (7) Extruded foods do not need further cooking or processing, and are ideal for midday school programmes of food distribution and for other mass feeding programmes.
- (8) Acceptability of this type of snack by the public is likely to be very good.
- (9) During processing there is very little damage to nutrients like vitamins, etc. as the cooking time is very short.

Raw Materials

- (1) Rice flour or broken rice
- (2) Corn flour or grits
- (3) Wheat flour
- (4) Defatted soya flour
- (5) Full-fat soya beans
- (6) Plain corn or wheat starch.

The above raw materials can be extruded individually or in combination. Their requirement of temperature, pressure and moisture vary. Some of the raw materials need conditioning prior to extrusion.

Cost

Capital Cost

A fully-equipped factory with an X-25 Wenger extrusion unit, Drier and Flavour applicator, along with other machinery like a Hammer Mill, Packaging machine, etc. will need a capital of about Rs. 30 lakhs. Much depends on the type of extruder and the type of product that is to be made.

Operating Cost

Figures of operating cost given below are based on information on Wenger units available from Nave Technical Institute, Bareilly. The following range of costs seem to be indicated for producing a Corn-Soya finger food resembling Muri, round in shape and about 3/4-inch long, with a density of about 200 grams per litre, which has been processed on a Wenger X-25 extruder (this has a capacity of about 0.5 tonne/hour):

| | | | | |
|-----|-----|-------------------------------------|-----------------|-----------|
| (a) | 50% | production, operating 1 shift only: | about Rs. 1,500 | per tonne |
| (b) | 50% | „ „ 3 shifts : | „ Rs. 800 | „ „ |
| (c) | 90% | „ „ 3 shifts : | „ Rs. 500 | „ „ |

If the next size of Wenger (X-155), which has about 6 times the capacity, is used, the range of operating costs should be as follows:

| | | | | |
|-----|-----|----------------------------|---------------|-----------|
| (a) | 50% | production 1 shift per day | about Rs. 500 | per tonne |
| (b) | 90% | „ 3 shifts „ „ | „ Rs. 200 | „ „ |

Wenger also produces an X-200 unit which is considerably larger than the X-155, and will give even greater economy.

Assuming the production of a 15% protein product with 350 calories per 100 grams, it would take about 85 grams to provide 300 calories and 12 grams of protein. Also assuming that this is produced on the X-25 unit at 50% capacity, in 1 shift per day, the nett cost of producing 85 grams would be 23 paise.

The same condition and product, run on an X-155 unit, would cost nett 14 paise. These costs include ingredients at current Delhi wholesale market prices.

Assuming that the above product is

produced on an X-155 unit running at 10% capacity, three shifts per day, the cost drops to 12 paise per 85 gms. of product containing 300 calories and 12 grams of protein.

Two conclusions can be drawn from this. One is that extrusion cooking appears to have a great potential for production of inexpensive foods for mass-feeding programmes. The other is that larger extrusion cookers are necessary to get the type of economy that mass-feeding programmes require. The smaller machines, such as the X-25, will serve (i) to produce products where price is not so critical and demand is smaller, (ii) to develop new products and refine old ones and (iii) for use in areas where it is not practical to set up the larger equipment.

Packaging and Shelf Life

The extruded products have a fairly long shelf life. This is due to their low moisture content and good fat distribution. These products, however, tend to absorb moisture on exposure to air but can again be made crisp before use by slight heating. More work has to be done in this direction. Extrusion-cooked products have low densities and consequently are bulky. Hence packing, handling and transport pose problems and the costs also are high. The cost of a 25 gm. pouch works out to about 10 paise. This includes cost of printing. Bulk packing can only be introduced in mass feeding programmes, where the entire contents of the pack are consumed immediately. The product absorbs moisture on exposure, and accordingly, the size of the pack should be based on the quantity of the snack which will be sufficient for one serving. People would generally prefer a ready-to-eat product to one which needs processing even if this is simply heating to expel the absorbed moisture.

Product 3: Groundnut Chutney

Introduction

It is perhaps appropriate that, following the outline on soft-buns, a concept like chutney which can be used as a spread for the same buns, is put forward. A product like groundnut chutney can also go very well with traditional food items like chapathi or rice. In fact such products are traditional ones made afresh with each meal in India.

With a high protein content and significant fat content, the groundnut is a very nutritive product. A processed food item like groundnut chutney can additionally be enriched with other trace nutrients like vitamin A, the B vitamins and calcium. India is one of the leading growers of groundnuts, and groundnuts and their products already find wide utility in Indian culinary practice. About 20 gms. of chutney constituting one serving, will provide about 120 calories and 5 grams of protein at a cost of 5 paise only.

Process

Chutney Paste

The graded and cleaned groundnut kernels are roasted to 430°C in revolving drums in lots of say 200 kg. for about 40-60 minutes, and then cooled as quickly as possible on platforms through which large volumes of cold air are drawn using suction fans. The cooled kernels are then passed in a continuous stream through a blancher, where they are subjected to gentle rubbing between brushes;

the red skins are rubbed off, and then separated by air blowing.

After careful visual inspection to pick out and discard defective kernels, the nuts are mixed with suitable quantities copra gratings, puffed chana (Bengal gram) dhal and seasonings like chillies, salt etc. The whole mixture is then ground in attrition mills, disintegrators or hammer mills which can be suitably adjusted to control the fineness of the grind. A chunky texture with several large particles of more than 1.5 mm. diameter is likely to be suitable for the Indian palate. The grind is then mixed using mixing pumps to ensure thorough and uniform dispersion of the ingredients, and any other materials desired are added. Some hydrogenated fat to thicken the texture, and emulsifiers like monoglycerides to prevent oil separation, are often added. The product is then cooled and packed into suitable glass or food-grade PVC jars, using filling machines. No sterilisation is needed.

The product processed as above is not subject to bacterial spoilage. However, the fat in it will become progressively stale and rancid during long storage. Mould infections may also pose a problem under very humid conditions.

A dry Chutney Powder

A second possibility is to use wholly or partly defatted groundnuts, avoid adding any oil, mix in any dry spice ingredients and prepare the product in the form of a dry chutney powder. This product will have a much longer storage life and can be packaged in

inexpensive polyethylene bags. The powder can be reconstituted by the consumer by mixing with water or oil to the desired consistency. The powder can also be directly sprinkled on sandwiches, eaten with chapathis, mixed with rice, etc.

By suitably modifying the additives and seasonings a range of chutney powders of different tastes and flavours can be manufactured.

All the machinery required for the manufacture of the product is simple and is already fabricated in India.

Marketing, Relating & Promotion

Since the groundnut is already a popular product consumed in various forms, the chutney should not face any problem of flavour acceptance. Replacing a freshly-made home item with a manufactured one will be the obstacle to overcome. The major hurdles to a commercial operation are likely to be cost constraints and packaging constraints.

The product in the form of a ready-to-use paste can be packed only in robust glass or plastic containers, and the latter must be of food-grade quality. Such a packaging is likely to increase the cost of the product to a level beyond the reach of a large section of the population.

Hence two different types, one the low-priced 'powder' in inexpensive packs, and the more sophisticated 'chutney' in fancy jars, can be offered, to cover large segments of market.

Suitable packings for the paste may be 500 gms. glass jars and 100 gm. polyethylene packs, and for the powder 500 gram polyethylene packs further placed in a cardboard carton.

The product, besides being retailed through normal channels of distribution, can also be promoted to customers through hotels and restaurants, as for tomato ketchup.

The promotional theme must emphasise the versatility of the product besides its convenience and nutritive value.

Product 4: A Banana-Based Food-Venture

Argument

This proposal is based not so much on the nutritive value of the banana, but on its excellent acceptability and huge seasonal availability in West Bengal, and in some other parts of India. Due to seasonal gluts, a significant quantity probably gets wasted as a result of rotting, and this is compounded by lack of cold storage facilities in our country. Processing of bananas into storable products will extend their usage period and conserve a wasted food resource. Some possible products are considered.

Dehydrated Bananas

Quality bananas are suitably sliced by mechanical slicers carrying stainless steel knives to avoid staining the fruit. The slices are soaked in water, washed, spread on wooden trays and exposed for one hour to fumes of sulphur-dioxide, to improve the keeping qualities of the product. Slices are then dried at a temperature of 140-142°F till they are bone-dry. These process details have been furnished by CFTRI Mysore. Packing in sealed polyethylene bags will preserve them for fairly long periods. Several packs could go into an outer cardboard carton.

Banana Chips

The dehydrated banana slices just described can be used to make chips at home whenever needed by frying in a suitable fat. The fried chips also can be manufactured, packed and

marketed. However, because of the high fat content, rancidity develops within 10 days, and a weekly distribution system must be developed.

Banana Flour

Ripe bananas, dehydrated as above and ground into flour, can be used to make good-quality vermicelli, baked foods (banana bread, banana cakes), beverages, etc.

Banana Weaning Food

An example from a recent article is given. Soak 1 part soyabeans in boiling tap water containing 0.5 per cent sodium bicarbonate for 30 minutes or more till soft. Add 10 parts water and grind fine in a comminuting mill. Add 1 part fresh ripe bananas and again mill fine. As a bleach, add enough sodium bisulphite to give 100 p.p.m. of sulphur dioxide. Dry to 3 per cent moisture in a double drum drier to give an excellent weaning food. Mix bananas as a starch source with oilseed flours to raise the protein level, and thermally extrude the mixtures to give infant foods.

New Technique

Osmotic dehydration deserves study. Ripe banana slices are dehydrated by keeping for 18 hours in a concentrated sugar or jaggery solution. About 40% of the moisture is removed and the slices can be dried even in the sun to a 15 per cent moisture content.

Assessment

These banana-based products are offered by way of suggestions for

extending the virtues of a seasonal food material. The economics of buying bananas in bulk and the true availability and sources need to be thoroughly studied. Thereafter the product concept should itself be identified, and manufactured on contract so that any technical problems are overcome. Test marketing studies appear to be necessary. Some risk capital will have to be invested for maximum success.

Product 5: Puffed Wheat/ Puffed Dhal Combinations

Background

The increase in rice production in the country has not kept pace with increase in wheat production. It is in the national interest to encourage consumption of a surplus commodity like wheat at the cost of a scarce commodity like rice. Nutritionally, the use of mixed cereals is also to be recommended.

Though both the products to be considered are based on cereals, they are meant to be consumed as snacks.

Product Concept

The acceptance of a new product is likely to be better, if it resembles an existing popular product. Puffed rice is enormously popular in the Calcutta area, being consumed by 26 per cent of the population. Hence a similar product, viz. puffed wheat is proposed. This can be prepared by the same techniques used for puffing rice, and will give a product of similar texture, though of new flavour and taste. The popularity of puffed rice suggests that puffed wheat would perhaps be acceptable.

A second proposal is for mixtures of puffed wheat with puffed Bengal gram or other grams in order to raise the protein level. Both these products could be eaten after flavouring with mustard oil and onions, as is done for puffed rice.

Promotion and Implementation

A strong promotional campaign in Calcutta city would be essential. Since this is a programme which fits in with government's policy of popularising wheat consumption, such a campaign also could be run by the State. It will be essential to use media which can reach at least the middle class, with some attempt to reach the illiterate also.

Thereafter a natural trickle-down effect is likely to occur; once the product is accepted at middle income levels and a demand is created there, demand will rise lower down also.

Puffing should best be encouraged as a small-scale industry, operating in local neighbourhoods. The present manufacturers of puffed rice would be the potential manufacturers of puffed wheat and puffed wheat-puffed gram mixtures. A modest production programme, coupled with a strong promotional programme, would create demand, and the supply would quickly follow. One can also hopefully rely on the market mechanism to keep the prices within the reach of even the lowest income groups.

5.2 Considerations arising from Working Group Presentation and Report on Snack foods

A. *Considerations:* Food items of proven popularity were selected as the basis on which to build possible product concepts. As described in the working group report, some of these products are presented in greater depth than others.

B. *Soft buns:* These could, for example, be packed in shallow cardboard trays carrying 18 buns with a cellophane overwrap. It was estimated that apart from the production cost of 25 paise estimated for manufacture and packing, an extra 5 paise per bun would be necessary towards distribution and promotion. It was emphasised that this 100-gram bun would deliver 300 calories and 11 grams of protein, besides vitamins and minerals.

C. *Enriched, extruded, puffed products:* Extrusion cooking had many advantages. The products could be tailor-made very easily for specific nutritional and pricing needs. Extrusion cooking ensured a sanitary food, but both undercooking and overcooking needed to be guarded against. Because of the very short residence time, there was no damage to the nutrients; in fact inhibitors in materials like soyabeans, and perhaps in dhal, were destroyed and hence the protein value upgraded. Shelf-life of the products was very good: products simply sealed in a polythene bag were in excellent condition after 6-months' keeping through one monsoon. Limited consumer trials had showed excellent acceptance. Apart from the present puffed product, textured products

resembling mutton, paneer, etc. could be made at a fraction of the cost of these materials (perhaps at Rs. 2/- kg.) using suitable dies on the extruder.

There were a few disadvantages also to extrusion cooking. The initial outlay for the equipment was very high, being about Rs. 20 lakhs for one make of machine with a fairly small capacity of 0.5 tonne an hour. Product cost was unusually sensitive to the volume of production: with a large machine, and working at high capacity, the cost of the product (300 calories and 12 grams of protein) could be as low as 13.7 paise per kilogram. The machine was very sensitive to power failures, even of a few seconds. Since the density of extruded foods was very low, shipping packed food for long distances would be expensive.

D. *Groundnut Chutney:* A flow diagram of the process for making groundnut chutney, as developed by the CFTRI Mysore, was shown (Fig. 5, p. 85). It was pointed out that the spicy groundnut chutney powders suggested would put to food use a material not now thus utilised, namely groundnut flour or cake.

E. *Banana and Puffed wheat-Puffed dhal proposals:* These two exercises were in the nature of suggestions which would require considerably greater economic and technical study.

F. *Some issues posed with reference to the proposed snack foods:*

I. Considering the proposed Masala Bun, what is the experience in

India of spicy, flavoured bakery products such as buns, biscuits, etc. among Indian consumers, e.g. in feeding programmes? Are sweet products preferred to spicy ones of the same type?

2. What promotional measures have proved more successful than others in promoting consumption of bakery products? Have any studies been made?
3. Would adding one-third of the daily requirement of appropriate vitamins and minerals to a snack food be suitable?
4. How successful has nutritional improvement been as a selling proposition in the Indian market?
5. A product like the proposed groundnut chutney would replace a home-made item. What promotional measures in such a case are likely to succeed with the Indian housewife? What has been the experience with products like iddli-mix, vada-mix, papads?
6. What scope is there for manufacturing other distinctively Indian culinary items with additional built-in nutrition?
7. Puffed corn or rice are now mostly local operations run with small capital. Would the puffed wheat—puffed dhal product described be best handled by such entrepreneurs? Advantages and disadvantages?

8. Some risk capital would be required to prove or disprove a proposal like the banana-based one. What sort of arrangements between industry and a technological research institute would provide an answer as to feasibility?
9. There are examples in consumer products of manufacture by small enterprises and distribution by the larger companies. Would this be possible in the food field?
10. Sales are the best index of acceptability. How effective has consumer testing, either before or after product launching, been in the Indian market?

5.3 Discussion on Snack Foods

The Chairman said that several product concepts which appeared feasible had been put forward with such support as the working group could muster. He particularly requested participation from those who had been specially asked in advance to scrutinise the Group report.

Flavour, acceptability and keeping quality of the soft bun and the extruded puffed product drew considerable attention. Generally speaking *fried foods* had excellent acceptability in India as convenience foods. It was possible to produce extruded products similar to fried foods, though not truly fried, by sprinkling the materials with hot oil as they emerged from the machine. Not only did this increase consumer appeal, but the cost was much less than

for deep fat frying; this was an advantage when the price of oil was as high as it was today. At present the manufacture of snack foods including buns (and except for bread and biscuits) was entirely in the unorganised sector. The organised sector had perhaps a part to play in this area.

Flavouring of snack products posed some intriguing problems. The extruded food product which was described and made had not been flavoured, and a choice allowed to the snack vendor or his customer to add such spices and flavourings as he may wish to; this was the present practice when buying puffed rice (muri). Of course spicing could also be built into the product when made. What spices would be popular? The experience of Modern Bakeries with their masala bun was that spice flavour preferences were distinct in different parts of the country, whether for onion, jeera or any others. Garlic was a flavour to be used with discretion. Use of a dried and toasted spice, rather than of a raw one, was essential to prevent rancidity and quick flavour deterioration. Older people preferred the spicy buns, and younger people the sweet variety. A suggestion was made that skim milk may be used in the bun so as to impart a very acceptable milky flavour, but the high cost of skim milk powder (Rs. 10—11/kg.), and the lack of availability of skim milk itself, ruled these out for the present.

Tied up with flavour was the question of *keeping quality*. It was desirable to ensure a storage period of 6-7 days

for a soft bun, but even the period of 3-4 days mentioned in the product concept was not easy to achieve. The hard bun kept much better than the soft variety, but was not popular in Calcutta city.

Why process foods at all? Why not distribute raw foods in feeding programmes? Was it necessary to suggest products like groundnut chutney or groundnut chikki: why not just groundnuts themselves? The groundnut chutney powder at least had a basis in that it sought to make use of a hitherto unutilised food raw material, namely groundnut cake. For the others, processing was one of the tools for quality improvement, and a product could only be promoted if it was in acceptable form. Wheat protein, and indeed most vegetable proteins, had low protein efficiency ratios (PER) of 1.0—1.5. What the body needed was a protein of PER 3.8 approaching its own. One could get such protein from eggs or meat, but where other proteins were employed, higher PER values would have to be sought by blending selected cheaper materials. Processing further served to make these raw materials more acceptable, more appetising and usually more nutritious. Since total calories and proteins would not be fully utilised in the absence of certain vitamins and minerals, the need arose, especially in feeding programmes, for balanced foods of high quality at a low price and in ready-to-eat form.

A great deal of discussion centred on the requirements of *national feeding*

programmes. Government had stipulated a cost of 18 paise for a food mix supplying 300 calories and 10-12 grams of protein, with another 5.5 paise for transport and distribution costs. Some technologists were of opinion that this price was impossible to achieve. Even the bun, one of the cheapest forms of delivering the required calories, proteins and micro-nutrients, had been costed at 25 paise per 100 grams in the working group report. It was important to understand the basis of the Government computation before it was questioned. The figure of 18 paise was based on local foods available in the village. In the feeding programmes, 40 per cent of the beneficiaries were fed with such local food resources and the remaining 60 per cent with processed foods. A higher figure for the latter would invite resentment and derision from the villagers. Indeed, the experience at several feeding centres was that where local foods were procured and cooked without processing, even a cost of 16 paise was possible. Such an exercise was actually in operation in Jamshedpur; moreover six different diets, to ensure variety while maintaining excellent protein quality, were being fed.* The cooking facilities in the bustees themselves were used without the need for central kitchens or other paraphernalia. The experience

at Coimbatore of a laddu costing only 12 paise for the quantum of nutrients laid down was also cited. In Kerala, CARE had developed a tapioca-based product meeting the requirements at only 15 paise. With raw foods the cost set was obviously well within reach. The next level represented simple roasted and ground ingredients, such as in Balahar, where a cost of 18 paise was attainable with ease. Further processing of foods raised the cost, but on the other hand did ensure lack of infection, freedom from rancidity, good acceptability, easy transport and no extra cooking costs at the point of feeding. Here, extrusion cooking in large volume was claimed to offer the distinct possibility of considerably lowering the price for a cooked food; there were of course other factors to be considered, like availability of extruders and their high cost, besides the technical expertise needed. The discussion led to the conclusion that a more *flexible pricing system* was called for. The following prices appeared to be necessary for 100 grams of food carrying 300 calories and containing 10-12 grams of protein, as required in feeding programmes:

| | Cost in paise |
|--------------------------------------|---------------|
| Uncooked food for rural distribution | 18 or less |
| Roasted, blended food | 23 |
| Processed food | 25 |
| Roller-dried products | 30 |
| Extruded products in volume | 20—22 * |

* Subject to further experience in India.

The relief feeding programme in Maharashtra was described as an example of the operation. This was administered by the Sadguru Seva Sangh Trust headed by Mr. Arvind Mafatlal. A price of 18 paise had been found unrealistic and one of 25 paise at the point of consumption had almost been accepted by Government. This price provided a small but acceptable margin of profit to all the agencies involved. The product used was sukhdhi, a blend of 66 per cent wheat flour, 10 per cent protein from various sources, and jaggery, the whole mixture being lightly fried in oil. From January 1973, some 5 million workers would receive, in addition to their wages, a quantity of 200 grams of this food every day, i.e. a total of 600 tonnes of food a day. It was pertinent that in any Government feeding programmes, UNICEF assistance was available only if commercial processing was involved, not otherwise. One manufacturer present stated that he was supplying every day 52,000 packets of processed food meeting the standard to his State Government at a cost of 18 paise inclusive of transport and was willing

* These were:

- Kitcharee (rice, masoor and chana dhals, potato, onion, fat)
- Porridge (toasted wheat sooji, jaggery, groundnut, fat, Provita powder)
- Upma (toasted wheat sooji, roasted chana dhal, groundnuts, onion, fat)
- Sambar rice (rice, arhad dhal, tamarind, onion, fat)
- Sweet pongal (rice, roasted chana dhal, sugar, groundnut)
- Toffee (toasted chana dhal, groundnut, toasted soya, jaggery, fat).

to do so anywhere in India. Actual experience with school children in Bombay under a feeding programme had shown that, where buns are concerned, about 80 grams was the maximum that could be consumed by a child, and even a 50-gram size was appropriate. Adding edible groundnut flour to a bun in suitable proportion hardly raised the cost since it was almost as cheap as the cereal which it replaced; the extra vitamins and minerals would add 3% to the raw material cost.

Apart from producing the nutritive food, a major problem in feeding programmes was that of *management and distribution*. In the Maharashtra arrangement, 3 or 4 large companies had pooled their special skills and were working in partnership with a service organisation as the distribution agency. A certain spirit of volunteerism was essential in a feeding programme since it was more than simply a profit-making venture. It was of course essential to ensure that the food reached the people for whom it was intended; it would be disastrous if milk for example were to reach not children but sweetmeat makers, as had happened with donated foods in the past. Perhaps this was easier if the food product was tailored so narrowly that it could not very well be used by others; such tailoring was quite feasible.



Chapter VI:

Beverages

6. BEVERAGES

6.1 Working Group Report: "Role of beverage as a carrier of protein"

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Introduction

Developing nations the world over are faced with a common problem of poor nutrition arising out of poverty. For many it is both a calorie and a protein deficit, with a serious shortage also of vitamins and minerals.

Certain vulnerable groups have higher-than-normal needs of proteins. It is a well-known biological fact that the major part of the human brain is formed before the child is 7 or 8 years old. Sufficient protein is essential for this brain formation. Deficiency of protein at this level is serious and is believed to lead to mental retardation. The tragedy is that once this has

happened, it cannot be reversed by later diet improvement.

Other groups with extra needs for proteins and vitamins are pregnant women and nursing mothers. High-protein foods for these sections, in which extra vitamins and minerals can also be incorporated, are highly desirable to ensure healthy, well-formed babies.

For all other segments, balanced calorie-protein foods containing other essential nutrients would be important nutritionally.

Why Beverages?

From birth, the infant derives his nourishment from a beverage, mother's milk. Later, animal milk is consumed as such or in the form of products like dahi and lassi, so far as the family income will permit. Acceptance is universal, economics decides the quantity.

Other beverages like tea and coffee are very widely used in every part of the country since they provide both refreshment and a sense of well being.

Beverages are also widely consumed at meal time: rasam in the South, turmeric and mustard-based products in the North, and lemon juice and other sherbets all over the country.

The phenomenal rise of the bottled drink industry in India over the last decade is eloquent testimony to the popularity of beverages.

As a vehicle for enhanced nutrition, beverages and beverage powders

commend themselves to marketing attention.

Creating new food habits especially at the lower economic levels, is a near impossibility. The search for nutritional beverages has perforce to be in the range of existing food habits of any particular segment of the population.

Scope

As a preliminary effort at tackling this problem, the Beverages Working Group for the Calcutta Workshop examined suitable products, both in liquid form and as soluble solids which can readily be reconstituted into liquid form. These are discussed in this report.

Target Group

Based on the findings of the Calcutta Food Habits Survey the complete exercise has been geared to cater to the consumer segment with a per capita monthly purchasing power of upto Rs. 80/-. In other words, upto lower middle class level.

The total lack of any disposable income in the lower economic segment rules out all possibilities of being able to purchase an additional food item, be it nutritive or not. Besides, habits die hard. So, it is extremely necessary to develop a product which will fit in with the dietary pattern, taste and flavour preferences of this group.

This item can only be in the form of a substitute for an existing commodity in their daily diet. Unless the product

meets all these requirements it will not be acceptable at all.

Marketing Problems

All nutritionally-enriched substitutes in the daily diet of this target group face the following problems—

- (a) acceptability
- (b) marketability
- (c) distribution.

Will the housewife consider the innovation as something useful and necessary which is worth procuring and using everyday?

Can she be at all enlightened about malnutrition and the effects of nutrition deficiency?

These are some of the acceptability problems which nutritionally-enriched beverages are likely to face.

On marketability, getting the housewife to consider it worthwhile to pay for the 'new' item as a substitute for some familiar item in her diet is the main problem. This is imperative if the product is to be at all commercially viable.

Finally, the vast and varied territory to be covered will require an equally widespread distribution network.

In this context it is useful to recall the NIRODH production and distribution exercise which has been successfully implemented in this country as a large-scale effort and is winning the plaudits of several other nations.

NIRODH is being manufactured as a commercial proposition, it is being marketed and distributed as a social benefit by some of the largest companies in the country and is finally being retailed at a profit. It is a careful combination of a profit motive and social obligation—the essence of the marketing concept.

It seems in the present-day context that a system of this type is desirable in the cause of getting better nutrition delivered to all groups of the population on a massive scale.

FIGURE 5
PRODUCTION OF GROUNDNUT CHUTNEY
PROCESS-FLOW DIAGRAM

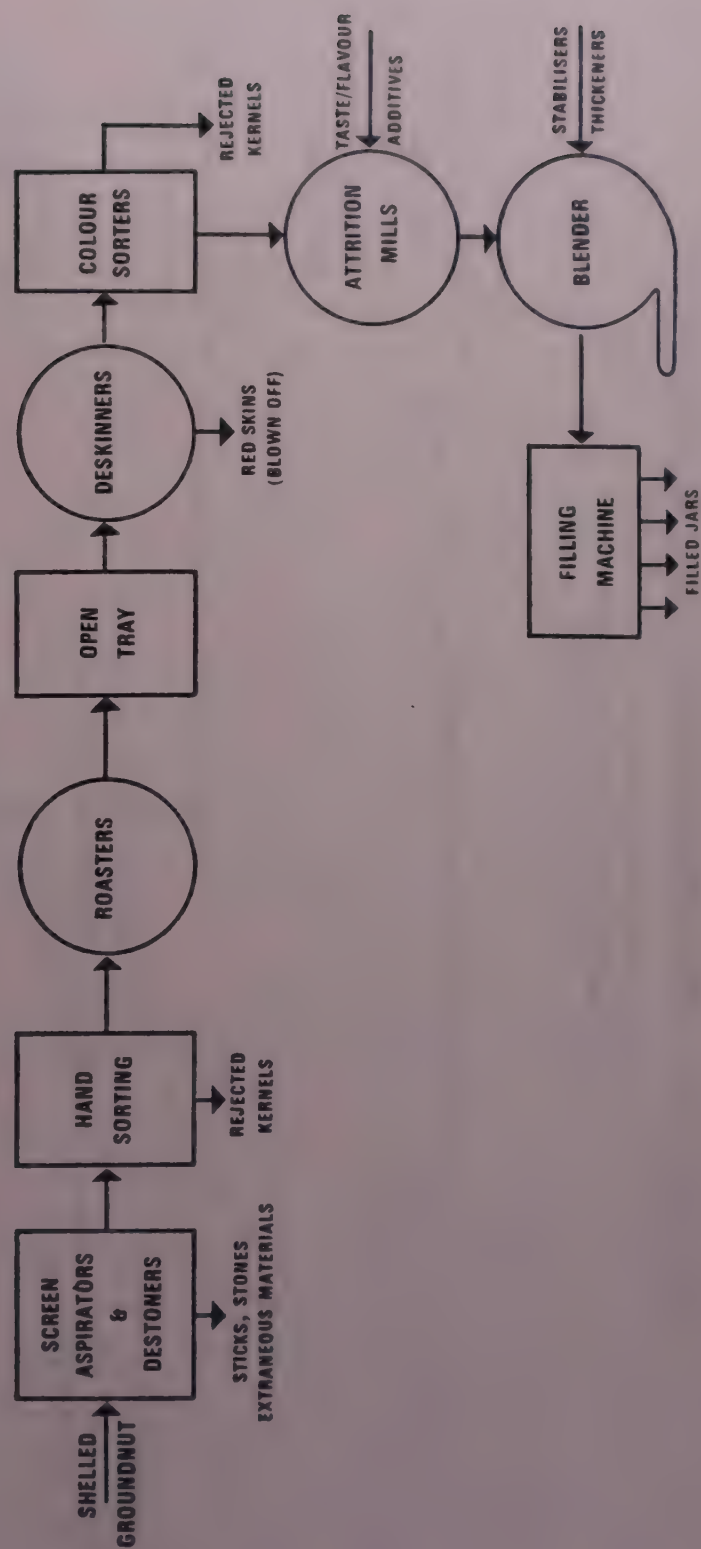
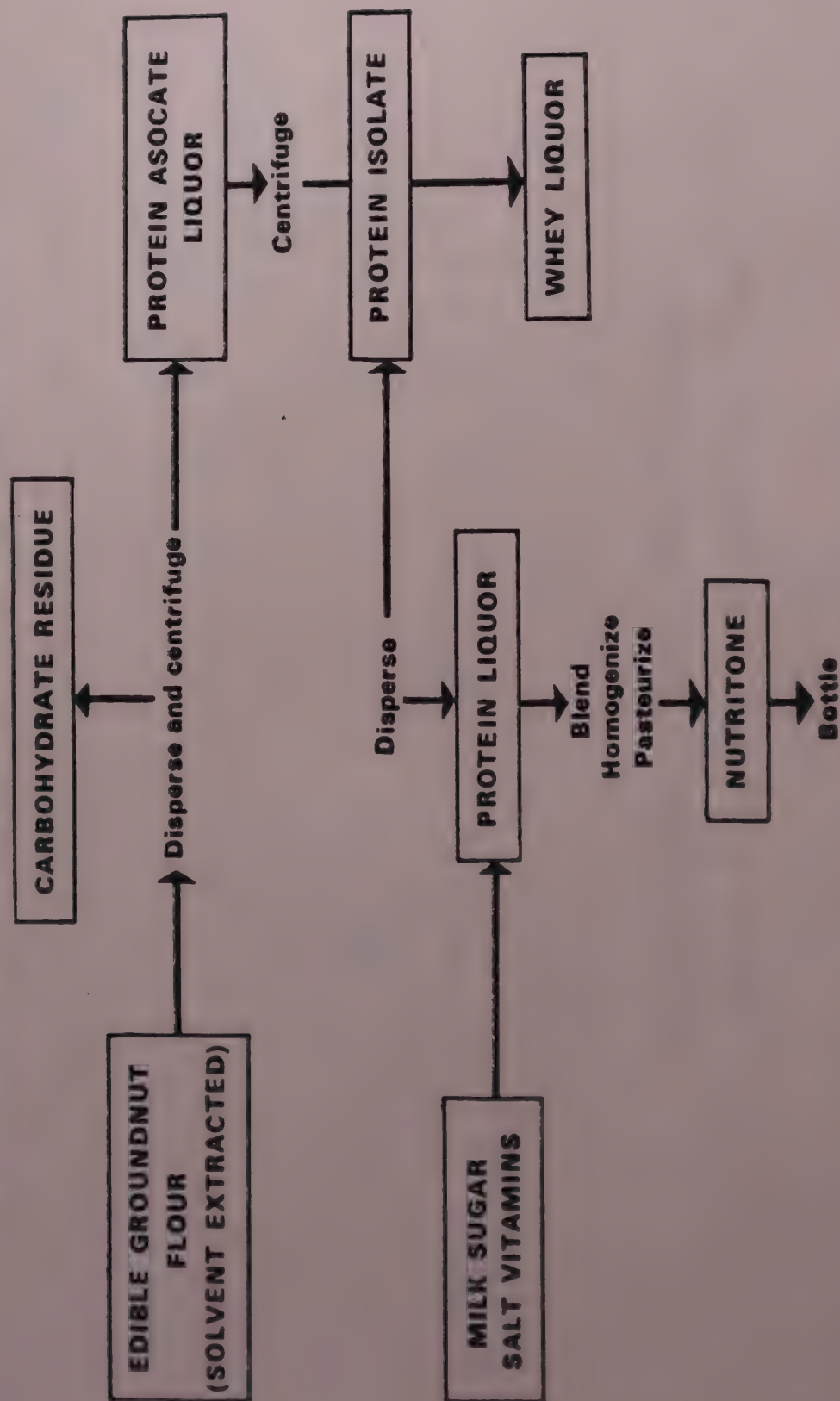


FIGURE 6 -- PREPARATION OF NUTRITONE



Product I: Nutritone

Milk occupies a unique position in the nutrition of infants and pre-school children, of other vulnerable groups like lactating and pregnant women, and of people suffering from malnutrition. This is a natural result of the nutritive value of milk, its universally-accepted flavour and the ease with which it can be fed. Of the annual production of milk in India, over 60% goes towards the preparation of butter and indigenous sweets. Add to this uneven distribution and low purchasing power—and the ultimate result is that very little milk is available to the people who really need it, the country's vulnerable population of 100 million under six-year olds and 20 million lactating and pregnant women.

In India today large quantities of toned milk are being prepared because of lower cost and availability of imported skimmed milk powder with which to extend the available milk supply. By toning buffalo milk which has 8% fat content a much large segment of the urban population's requirement can be met.

Vegetable protein-based milk like soya and groundnut milk have been tested as substitutes for bovine milk both in India and elsewhere. Recently, soya with improved flavour has been prepared and recommended as a solution to countries with nutritional deficiencies. Soya is deficient in total S-amino acids, lysine, threonine and possibly tryptophan; its chemical score is 43.

By using extracted protein from groundnut the objectionable beany smell is overcome.

NUTRITONE is a vegetable toned milk. The product has been developed at CFTRI Mysore under the name of Miltone, with which the present product is practically identical.

Why Nutritone?

To use indigenously-available vegetable protein, viz. groundnut protein, to replace imported skimmed milk powder in the toning of milk and thus provide a nutritious milk-like beverage for those who cannot obtain milk because of short supply or of high cost.

Composition

Milk, edible groundnut flour, acids, alkalis, vitamins, salts.

Protein content

4 gms. of protein per 100 gm. of Nutritone.

USES

Can replace milk in every way.

Can be easily made into curd (yoghurt) whose characteristics are comparable to curd from milk.

Suitable for drinking by itself, or in coffee or tea, or as a mildly flavoured drink.

Characteristics

Milk-white in colour.
Can be pasteurised or boiled without sedimentation.
Specific gravity 1.030.

Process

Solvent-extracted peanut flour is dispersed in alkaline water in 200-litre stainless steel tanks provided with stirrers. Protein liquor is separated in a horizontal bowl peeling centrifuge after clarifying the liquor further in a disc-type separator and detoxifying it with hydrogen peroxide. The detoxified liquor is pumped into a tank in which the protein is precipitated by addition of 5N-sulphuric acid.

The protein precipitate is separated from the liquor in a centrifuge and redispersed in water and later homogenized in a colloid mill. To remove the peanut flavour, buffer salts are added and the liquor is sparged with live steam.

The deodorized liquor is pumped into a pasteurising unit mixed with the requisite amount of liquid glucose, vitamin premix and standard milk. Nutritone thus obtained is homogenized and pasteurised, then cooled to 40°C, bottled and capped.

Costs

30 p. per bottle of 200 ml. or
90 p. per litre as against Rs. 1.10 for
toned milk and Rs. 1.26 for standard
milk (selling price at Bangalore).

Assessment

A Project which can be used for institutional feeding programmes and as a supplementary activity of The Milk Developing and Marketing Organisation.

Product 2: Nutrimilk

Several programmes have been instituted in many countries for supplementing by other means the milk produced. Use of skim milk powder and milk fat for recombining to milk was practised during World War II. In India such programmes have been in operation for nearly two decades, and recently an intensive practical operation has been undertaken in four major cities to supplement the available milk with toned milk.

Much work has been done on the use of vegetable proteins for the preparation of milk-like substitutes. Under the auspices of the National Dairy Development Board, the Baroda Co-operative Dairy has started a project to produce a milk substitute/tea whitener from vegetable proteins.

NUTRIMILK is a vegetable-based milk containing no animal milk.

Composition

Fat, Protein concentrates, Stearates, Dispersing agent, Buffer salts, Thickeners.

Protein content

12% protein with above composition; biological quality of the protein can be raised further with methionine fortification.

Why Nutrimilk?

To provide a protein-rich milk substitute for (a) preschool children (b) lactating and pregnant mothers (c) persons suffering from malnutrition

To provide a protein-rich milk extender to (a) all drinkers of tea and coffee (b) restaurants and hotels, and thus to free large quantities of standard milk for the vulnerable groups.

Uses

Can be used with tea or coffee.
Can be used as a milk extender.
Can be drunk straight.

Characteristics

White appearance resembling milk.
Can be used dry or in liquid form with tea or coffee.
Can be boiled.
Can be easily fortified with vitamins and minerals.
Tastes like cow's milk.

Process

The ingredients are mixed in water, then homogenised in a homogeniser. The emulsion goes to a pasteurising unit from where the constituents pass into another homogeniser for sealing into laminate sachets or pouches.

Costs

Raw materials costs amount to Rs. 5/- per kg. of the finished product.

The total cost is roughly Rs. 9/- per kg.

Assessment

A perfectly commercial proposition well worth developing as a marketing operation.

Product 3: Nutripak

One of India's most important problems is that of improving the nutrition of her people. Insufficient nutrition increases infant mortality rates and the frequency of illness and disease.

Four main areas comprise the critical nutritional problems in India today. These are (a) protein-calorie malnutrition (b) vitamin A deficiency (c) iron, vitamin B12 and folic acid deficiencies (d) vitamin B-complex deficiencies (niacin, riboflavin, thiamine).

In the past few years efforts have been made in India to develop fortified foods with the intention of supplementing the diet: atta, bread, salt and tea have all developed fortified prototypes. Extensive studies have also been made by the firm of Roche, under the name NUTRICUBE, to prepare and test-market concentrated compressed cubes as carriers of nutrients.

NUTRIPAK is a dietary vitamin supplement.

Composition

Vitamin A, vitamin B-complex (niacinamide, riboflavin, thiamine mononitrate, pyridoxine hydrochloride, folic acid), ferrous sulphate.

Each Nutripak will weigh approximately 3 gms. and is directed towards the consumer unit of 2 adults and 4 children.

The Nutripak can be developed in 2 varieties:

- (a) unflavoured
- (b) flavoured (garam masala).

Why the Nutripak?

It will help make a significant contribution to meet dietary vitamin deficiencies of the poorer strata of the population in both urban and rural areas by supplementing their daily diet with vitamins and minerals, such as vitamin A, vitamin B-complex and iron.

Can be added to dhal, vegetables, curry but should not be taken by itself.

The compressed tablet must be crushed into powder and mixed with cooked dal or curry or any other recipe involving a sauce or soup just before removing the pot from the fire.

To what extent is the nutrition requirement served?

Of the recommended dietary allowance for 2 adults and 4 children, the Nutripak could be formulated to provide approximately

- (a) 70-80% of the vitamin A requirement
- (b) 25-35% of the niacin requirement
70-80% the riboflavin requirement
20-30% of the thiamine requirement
- (c) 20-25% of the iron requirement
50-60% of the folic acid requirement.

This is based on the formulation of the Nutricube of Roche.

Other *advantages* of the Nutripak are that it:

Is the least expensive method of making available key nutrients for rural consumers.

Maximises the vitamin and mineral quality of whatever food is already eaten.

Improves health, and therefore lessens the need for health services and facilities.

Problems facing the Nutripak can be outlined as follows:

Will the housewife accept the Nutripak idea at all?

Will she consider it worth taking the trouble to obtain?

Will she remember to use it?

Will the housewife be willing to pay for the Nutripak?

Can the Nutripak be made desirable as a result of nutrition education?

How can it be distributed in a country as vast and varied as India?

Can it be a commercial proposition or will it need Government subsidy?

These are some of the relevant questions that have to be answered.

Assessment

A distinct possibility, but will need an intensive and expensive promotion campaign.

Product 4: Nutritab

In order to supplement protein intake of different sections of the population with wide disparities in purchasing power, several artificial means have been developed. The protein-enriched flavoured tablet is one such.

In more developed economies, awareness of the effects of malnutrition being much higher, the soup tablet functions mainly as a taste-additive or flavouring agent.

The formulation and costs of the protein-enriched tablet and the taste-additive tablet are quite different.

The NUTRITAB can be of two types:
'Rasam' type
Thickener/flavoured type

Composition

Animal fat, * protein hydrolysate for flavour, vegetable fat, sweetener, spices, colouring matter.

* For meat-based tablets only.

Protein content could be as high as 50%.

Why the Nutritab?

To supplement protein intake by addition to the daily diet. To substitute non-mealtime drinking habits (e.g. tea, coffee) with a nutritive drink carrying an acceptable flavour. To act as a taste-additive/flavouring agent in some main dishes (e.g. dhal or curry). To thicken dhal/curry (mainly in North India).

Uses

Rasam type tablets should be crushed and dissolved in hot water giving a non-clear tasty liquid to be taken with rice or by itself.

Flavour additive/thickener type tablets should be crushed and dissolved in hot water and added to *dhal/curry* before removing from the fire.

Four tablets (10 gm. each) should be used by a family daily.

Characteristics

Soluble in hot water.

Possible in various flavours *, such as: sweet, sour, curry/chilli.

Can be vegetable or meat based.

Shelf life (if dry) is 1 year.

Versatile enough to adjust to most taste, flavour, viscosity and colour requirements.

* Tomato, chicken, lime and pineapple are already in commercial development.

Process

The hydrolysate protein (e.g. yeast) extract (either bought granulated or granulated in the process) is ground to the required mesh. Soup stock is added and the paste homogeneously mixed to a good dough in a powder mixer. The other items are mixed together and the whole mixed homogeneously. The paste is dried in stainless steel troughs, then cut to the required size and packed.

Packing

The tablets may be placed in

- (a) aluminium foil coated with microwax or
- (b) aluminium foil laminate overwrap sealed on 3 sides or
- (c) a glass jar, hermetically sealed or
- (d) aluminium foil laminate flat pouch.

The packing material must be selected bearing in mind the following:

- (a) The characteristics of the product
- (b) The distribution area
- (c) Required shelf life
- (d) Total cost per unit
- (e) Product image.

Costs

Raw material costs for a 10 gm. soup tablet work out to approximately 4 paise. It is envisaged that a 10 gm. tablet can be retailed at between 25-30 paise.

Assessment

A perfectly commercial proposition well worth developing as a marketing operation.

6.2 Consideration arising from Working Group Presentation and Report on Beverages

A. General: The Chairman of the Working Group emphasised that an attempt had been made to reach the lowest income segment, and to build on such existing foods as milk. Both the milk-like products presented were actually in semi-commercial production and the working group felt that they deserved even wider implementation. The vitamin cube had actually been made by a well-known international company and thorough acceptability trials were indicated. The protein-rich flavoured tablets were also fully developed and only awaited commercial testing and marketing.

B. Nutritone: This vegetable-toned milk was developed at CFTRI Mysore under the name of Miltone to replace imported skim milk powder with an indigenous material based on groundnut protein. Its composition was similar to that of animal milk in respect of both major and minor nutrients, except for a higher level of vitamin C. The carbohydrate was 50% lactose and 50% glucose. It could be distributed like milk in foil-capped bottles and drunk hot or cold, or made into excellent curds. Alternatively it could be sterilised for longer life and marketed as a beverage in crown-capped bottles. Both these methods were in use in Bangalore. Though the protein efficiency ratio of the protein was 2.4 against 3.0 for milk, the feeding value for children had been shown to be of the same order for

both. In one trial, two groups of about 20 children each were fed for 6 months either with toned milk or with the present product; similar increases were recorded both in mean weight (1.2 kg, 1.4 kg) and mean height

(4.4 cm, 4.7 cm).

The flow sheet (Figure 6) illustrated the method of manufacture. The following was a realistic cost of production for 12,000 litres or 60,000 bottles of 200 ml. each of Nutritone:

| Direct cost, Rs. | | | | Indirect cost, Rs. | | | |
|------------------------|-----|-----|--------|--------------------------|-----|-----|-------|
| Raw materials | ... | ... | 9,860 | Maintenance and repairs | ... | ... | 220 |
| Utilities | ... | ... | 419 | Depreciation | ... | ... | 780 |
| Packaging of bottles | ... | ... | 4,010 | Administration expenses | ... | ... | 150 |
| Labour and supervision | ... | ... | 276 | Interest on capital @ 9% | ... | ... | 1,017 |
| | | | | Other expenses | ... | ... | 110 |
| | | | 14,565 | | | | 2,277 |

Total cost of 60,000 bottles: Rs. 16,842

Cost per 200 ml. bottle: 28.04 paise

Cost of pasteurised Nutritone: Rs. 1.09/litre

Thus the product was 15-20% cheaper than double-toned milk and 25-30% cheaper than standard milk. It could be sold in Bangalore without financial loss at 85-90 p/litre. Sterilised Miltone in crown cork bottles was being sold at Rs. 1.50 per litre.

Acceptability was excellent. The production of the Bangalore dairy had gone up in 4 years from 600 to 3000 litres per day, and was only limited by the plant capacity, not by demand. Children accepted the product readily and so did adults once the slight difference in taste had become familiar. Miltone was at present distributed from the Bangalore Dairy through the Social Welfare Department of

Government. For commercial distribution, the present milk bottles should be utilised, while the sterilised beverage product could appropriately be sold at booths stocking soft drinks and other beverages. Initially incentives like bottle coolers or advertisement posters could be employed.

Factories in Andhra Pradesh, Kerala and Mysore for manufacture of the product were under the active consideration of the Central Government.

C. Nutrimilk: The marketing challenge lies in delivering nutrition through appropriate product concept, acceptance and distribution. Protein,

where successful, has been employed more for function than for nutrition; the 60,000 tonnes annually of soya protein used in food products in the USA have replaced skim milk powder because they provided the desired function at lower cost. In India, animal milk has universal acceptance and many outlets. Some of these are nutritionally critical, whereas others simply utilise the whitening or flavouring quality of milk. In the latter uses, usually by groups who do not need animal milk, replacement is possible with solid or liquid products tailored to meet the particular end-function desired. Another approach is to stretch existing milk supplies by toning with a vegetable-based derivative. On the basis of cost, functionality and nutrition, oilseed proteins are today the best available material for this purpose.

Nutrient fortification itself is not going to bring about great marketing success; the task is to popularise the product in the market place. Once this is done, there may be a case even for legislative constraints to foster healthy trends whereby normal milk vacates certain areas and reaches instead truly malnourished groups in the less affluent sections of our society.

For a typical whitener or milk extender, the pasteurised liquid described by the earlier speaker would need to be spray dried to a powder and treated in a fluidised bed drier (instantiser or agglomerator) so that it achieves instant dispersibility in use. A plant with a beverage capacity of 500 tonnes

a day would cost about Rs. 45 lakhs and yield the product at a price of about Rs. 9/- per kg.

Problems of acceptability would require attention to flavour, and marketability should be sought by product promotion on its real economic and functional merits rather than from an "imitation" angle. Distribution could be either through the present commercial channels for nationally consumed products (tea, coffee) or through subsidised feeding agencies. A Government—industry—dairy industry dialogue is needed to ease legislative constraints, and to ensure a national approach to socially-equitable distribution of scarce nutritional resources such as milk by the adoption of a new technology.

D. *Nutripak*: Vitamin deficiencies were greatest in the lower income groups, where food habits also tended to resist change. This product concept could meet both social objectives and the profit motive. Its production was a simple operation. The ingredients are analysed, mixed in suitable proportions granulated, slugged, compressed, analysed again and packed. Rigid packaging was essential: 30 cubes, equivalent to a month's requirement, could be packed in a heat-sealed aluminium foil/poly and then further placed in a high-density polyethylene box. A pilot study had been proposed for distributing *Nutripak* in two small towns, one in Tamil Nadu and one in Gujarat. Since an expenditure of Rs. 7-8 a month would be involved, commercial targets would be the

middle and upper income groups. Three alternatives appeared possible:

- (a) that a commercial organisation produce the product on a no-profit, no-loss basis;
- (b) that distribution be done, as for the contraceptive *Nirodh*, through existing large marketing organisations; or
- (c) that Government assume responsibility for promotion and distribution, either at cost or free.

E. *Nutritabs*: These were high-protein products based on hydrolysed protein and compacted together with fat as a binder. A wide choice of additives and flavours was possible. The product could be made in two types. One would give a nutritious hot drink to accompany rice or as a sort of soup, and the other could be added to a dhal or curry to thicken and flavour it.

F. *Some issues arising from the products proposed*:

- 1. What has been the consumer acceptance of nutritious beverages like *Miltone*?
- 2. Are there any clear indications, as there are in say Hong Kong, that the "fun" approach to selling even a nutritious beverage is more effective than a "nutrition" approach?
- 3. All the present nutritious beverages contain some animal milk. Is this for nutrition, to impart a milk flavour, to effect

distribution by milk-distributing agencies or for promotional purposes?

4. Are there any consumer acceptability studies on total groundnut milk or soya milk in India?
5. A number of questions have been raised in the Working Group report on the promotion of a product like Nutripak/Nutritab. Is there any experience of the acceptability or promotion of such a product in India or elsewhere?
6. The point has been made that a longer, 10 to 15-year pay-off period should be accepted for nutritious beverages to achieve penetration to lower income markets. What would favour/disfavour such a proposition?
7. Considering availability of nutrients, food laws, technical problems, cost incentives, etc., is the enrichment of existing beverages with a wide reach, such as soft drinks, a feasible proposition?

6.3 Discussion on Beverages

The Chairman emphasised that the *product concepts* were far from being speculative. For example, the fortification of tea was considered by the working group, but did not find a place in the report since it was felt to be premature to do so. Some of the products described were even in production, others required longer trials, but all were *a priori* perfectly feasible. The climate had changed over the years; the opposition from the dairy industry to milk substitutes was less vocal now, since there were no soft options and it was a question of using the raw materials which we had. Again, acid hydrolysis of proteins was once argued against since the protein quality which resulted was less than by enzyme hydrolysis, but the real point was to employ the methods which we had at our command. It was better to have something than nothing.

Of course no single food item could be a panacea for all nutritional gaps. Products to fill shortfalls in micro-nutrients were not too difficult or expensive to devise. Where macro-nutrients were involved, processed foods were often too expensive for the vast needy majority. If government support of these turned out to be too great an economic strain, there seemed no alternative but to depend on natural foods. It was obvious that at the lowest levels, an increase in food production was essential in the long run for nutritional improvement.

It was pointed out that to prevent inflating the reports, all *details* of the

costing of the products had not been given; these could be had from the authors of the product concepts. Obviously scales of operation, raw material prices and profitability scales would all affect the final cost estimate: no figure was definitive, but the costs given in the report were quite realistic. In some cases, feasibility had to be assessed by experience, since definitive data for evaluation were lacking.

A major part of the discussion centred on the concept of the *vegetable toned milk product*. This was actually being produced in small operations in Bangalore and Mysore, and in a flavoured form as a fun drink in Bombay. The *price* was half that of double-toned animal milk. For a production of 12,000 litres a day, in a certain true city situation and considering all cost aspects, the best possible estimation gave a price of Rs. 1.09 a litre. Optimum, break-even scales of operation had not been worked out. Groundnut isolate was commercially made and sold at Rs. 6.50 a kg. in Bombay, while milk protein worked out at Rs. 18 a kg. These figures served to give an idea of relative costs. For the quantum of nutrition delivered, the cost of the milk was within the figure of 18 paise prescribed by Government.

The *use of isolates* had the advantage of easy formulation. Cheaper raw materials like the oilseed itself (groundnut, soyabean), or a full-fat or defatted flour, could be used to make milk, but there were several

difficulties, of which flavour was one. Moreover the isolate could be used in a slurry form as obtained, and one did not have to go to the expense of spray-drying it before use. The residue after extraction of isolate was not wasted. It had no toxic constituents, carried 25-30 per cent protein and had a slightly high fibre content, but could itself even be used as a children's food. Being of lesser quality than the isolate, at present it went into cattlefeed.

The *feeding value* of the vegetable-toned milk was almost the equal of animal milk for weaned and even for newborn children. Animal milk if freely available would certainly be the food of choice. It was because there was insufficient to go round, and the cost was high, that it seemed reasonable to extend supplies by toning with such food materials as were locally available, like groundnut or soya protein. Nor was there any danger of exhausting scarce resources, since an enormous quantity of groundnut cake was exported, and the use of a small part of it for making a food product like milk was no cause for concern.

There was nothing sacrosanct about *natural animal milk*. Children would stand to greatly benefit by its nutritive value if it were further fortified with fat-soluble and water-soluble vitamins. Protein content was a species characteristic, and was as high as 12 per cent in the milk of a fast-growing species like the rat, and only 1.5 per cent in human milk. Even in regard to quality, it was to be noted

that cow and buffalo milk protein was itself deficient compared to the ideal of muscle protein. Of course there was cause for concern if the quality of milk protein was further reduced as a result of toning with lower-quality proteins; children needed the best. On the other hand there was a good case for replacing the expensive fat of milk with cheaper, and nutritively better, fats. People who wanted the milk fat which had been removed were welcome to pay for it as butter or ghee. The toned milk product which was described in the group report had itself only 2 per cent fat, but this amount could be raised without difficulty.

Some information was sought on the *rationale of fortication* of the toned milk. The levels of vitamins and minerals had been aligned to those of natural milk, except for a higher level of vitamin C. Generally speaking this was a safe rule to follow when a natural product was sought to be replaced. Over-fortification did introduce problems when so many processed foods were all being fortified. For the latter products, the quantity consumed should govern the level of fortification employed. For a pharmaceutical-type preparation, eaten in very small quantity every day, a much higher level was obviously called for than in a macro-food.

In regard to *flavour*, while in India milk had found widespread acceptance through long usage and familiarity, other flavours appropriate to a milk replacement had hardly been

investigated. The present product contained animal milk, and the flavour was still that of the latter. Flavours for health or fun milk beverages were in a different category; a badam (almond) flavour was traditionally acceptable in India, but other flavours like ice-cream soda and vanilla were also being subjected to consumer testing.



Chapter VII:

Infant Foods

7. INFANT FOODS

7.1 Working Group Report: “Concepts for supplementary foods for infants”

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1. Introduction

1.1 The chain of over-population—poverty—illiteracy inevitably brings in its wake the problem of malnutrition. In our country, so widespread is this problem that, unless specific strategies are developed to combat malnutrition, both at micro and macro levels, the situation is likely to become even more critical.

1.2 A particularly vulnerable group has been identified as infants upto pre-school age of 4 or 5 years especially those coming from low-income families. It has been universally recognised that lack of protein in the daily diet of this group could cause permanent damage in terms of retarding mental and physical growth. Earlier diet surveys conducted in Gujarat and Maharashtra by the PFAI have demonstrated the inadequate intake of proteins. The Calcutta Food

Habits Survey sheds even further light on this critical problem of malnutrition. The Infant Food Group, examining the findings of this Survey, has concluded that while lack of proteins in the daily diet is certainly a critical factor which calls for immediate action, it is more useful to perceive the problem as a ‘total nutritional gap’ rather than merely as a ‘protein gap’.

1.3 There are good reasons for arriving at this conclusion. Thus the Calcutta Survey indicates that while the necessary protein intake (18 g./per day for children, 55 g./per day for adults) is more or less met, these proteins fail to contribute as cell-tissue building ingredients unless an adequate calorie intake is also ensured. Furthermore, the overall deficiency is in terms of the calorific value of the daily diet, occurring parallel with deficiencies in proteins, vitamins and minerals (mainly vitamin A and iron).

Therefore, the Group feels that it should offer a balanced nutritional supplement rather than merely a high-protein food.

2. The opportunity

2.1 The Infant Food Group considered its major task to lie in identifying low-cost nutritional products for infants from 4 months to 5 years, which could provide the necessary missing intakes of carbohydrates, proteins, vitamins and minerals.

2.2 After the product concepts have been identified, it is necessary to

recommend a total marketing and communication strategy for the products concerned.

2.3 We have recommended in this Report two distinct product concepts which address themselves to two slightly different but partly overlapping target groups. The first product, a supplementary liquid food, addresses itself to 4-month to 2-year old infants, and the second one, once again a supplementary concentrated food, is meant for infants from 9 or 10 months old to pre-school-going children of 5 years.

2.4 The Calcutta Food Habits Survey highlights a number of significant attitudes and beliefs which lead us to believe that a packaged baby food product is perhaps the best proposition. The Group considered the possibilities of marketing a low-priced infant food, but after considerable thought, this idea was dropped. It was felt that the constraints in cost and in availability of lactose, skim milk powder and tinplate all pose serious hurdles to marketing a low-priced manufactured infant food for the vulnerable group.

2.5 Therefore, our Opportunity Area needed to be re-defined. The Group believes that, while the concept of ‘weaning’ is not universally recognised, what is needed is a supplementary food clearly positioned for the growing infant and priced as low as possible to enable it to reach the vulnerable segment.

2.6 The Group also believes that one of the products recommended, a fortified dairy milk supplement, could be taken up by the organised Dairy Industry (State or Central). Apart from being used in institutional feeding programmes, the Milk Development and Marketing Organisation or the National Dairy Board could effectively sponsor the manufacture and distribution of such a product.

2.7 The other product, which is a packaged food to supplement the daily diet of growing infants, can possibly be jointly marketed by marketing firms along with a State or Central Agency or such world bodies as UNESCO. We believe that some form of assistance from Government or quasi-Government agencies will be necessary to combat infant malnutrition on a national scale.

3. Marketing Problems

3.1 The Infant Food Group believes that marketing a product primarily on a nutritional basis faces some special problems.

3.1.1 It is very difficult indeed to change food habits. Therefore, recommended products should fit in with existing food habits and not try to create new ones.

3.1.2 Taste of the proposed product is of vital importance, because it is apparent that parents, more specifically mothers, are going to decide on the acceptability of the product. If the product does not appeal to them,

chances are that it will be rejected even before it is offered to the infant.

3.1.3 The communication problem is a major one in creating an awareness among the vulnerable groups that their existing food habits are unsatisfactory in providing adequate nutrition. Since adoption of new ideas in matters of food is relatively slow, even among upper income families, a new nutritional food suffers from the initial inertia of the group for which it has been marketed.

3.2 Two other problems need to be recognised here.

3.2.1 One concerns the marketing of nutritional products which will have to be either subsidised or sold at a very low profit. The entire project has then to be tackled on a 10-year to 15-year pay-off period and largely as a social obligation rather than as a normal profit-making venture with a 3- to 5-year pay-off period.

3.2.2 The second problem is of packaging and distribution. Both these areas call for considerable innovation to reduce costs and bring the product within reach of the vulnerable segment.

PRODUCT CONCEPT 1: Fortified Dairy Milk for Infants

1. Nature of Product

The special dairy milk will be fortified so that each serving of 200 ml. will provide the following:

| | | Calories |
|--|-----------|----------|
| Fat | 6 g. | 54 |
| Milk protein | 7 g. | 28 |
| Protein isolate from vegetable sources upto | 13 g. | 52 |
| Lactose from milk | 9.6 g. | 38.4 |
| Carbohydrate which may include Sugar, Glucose and others | 6 g. | 24 |
| Vitamin A | 1500 i.u. | |
| Vitamin D | 400 i.u. | |
| Riboflavin | 0.9 mg. | |
| Thiamine | 0.5 mg. | |
| Ascorbic acid | 30 mg. | |
| Ferrous sulphate or Ferric ammonium citrate | 6 mg. | |
| Total calories | Approx. | 200 |

2. Rationale

2.1 Milk has been considered as nearest to a complete food. Milk is also the most acceptable form of food from birth. In all sections of the community, if milk were available at acceptable price and quality, it would be the preferred form of food for infants.

2.2 However, the lack of availability of milk, particularly in the urban areas, and even in many rural areas, for the poorer sections of the people, has always been acutely felt. The proposal which we wish to present is to organise a supply of special milk for infants within a total plan. This product can hope to meet to some extent the needs of infants in a selected area.

2.3 UNICEF and CARE have done some pioneering work in regard to providing milk for infants. A large number of schemes have been organised by these two international organisations for such feeding. The experience gained by them not only in India, but in many parts of the world, is a pointer to raising milk for infant welfare schemes.

2.4 The organised sector of the dairy industry should earmark part of its capacity for meeting the requirement of milk for infants. A special milk should be devised to cater to these special needs. Handling, distribution and pricing of such milk for infants may be considered under the overall

plan of bridging the nutritional gap, and every effort should be made to see that the desired quantity of special milk actually reaches children belonging to the needy sections of the community in which the project is launched.

2.5 We can approach the problem of feeding infants from the point of view of supplying just milk, or an extended milk to which can be added proteins from vegetable sources. The addition of proteins to bridge the nutritional gap is recommended since, within the scope of distribution of the liquid, a higher quantum of nutrition can be supplied. We can of course work with two models, one being milk and the other a milk product which is further fortified with vegetable proteins. This would be akin to the Miltone concept of CFTRI Mysore, but with a higher nutrient level. The results so far achieved in the marketing of the Miltone type of product have been very encouraging.

2.6 We have now to examine whether a product of this type can be specially designed for infant feeding, including the addition of the required proteins, vitamins and minerals, particularly iron. We can also add sugar for more calories and to impart an acceptable taste. Flavour can be kept optional.

2.7 It is proposed that this special milk be distributed in milk bottles of the usual design, but of strawberry colour, so that it is readily perceived by the household as specially-fortified milk for infants.

3. Distribution

The programme of distribution of the special infant milk should be so designed that each infant shall get 200 ml. of the product each day. From the above calculations it will be obvious that, with this level of feeding, the infant will receive upto 20 g. of protein and 200 calories every day plus all the requirement of vitamins and important minerals like iron and calcium.

4. Cost

The cost of special infant milk is likely to be in the neighbourhood of Re. 1/- to Rs. 1.10 per litre. If it is handled in bulk, there could be some economies of scale and the ex-dairy cost could be brought down to perhaps 90 paise per litre.

5. Consumer Price

It is proposed that this special infant milk should be made available to mothers at the rate of 20 paise per 200 ml. bottle.

6. Findings

6.1 The organised sector of the dairies in a city like Calcutta should be able to put out 25,000 litres of milk per day for infants. This should serve an average of 1.25 lakh infants every day.

6.2 The above proposition may involve a subsidy to the extent of 15 to 20% of the cost. The overall cost of feeding 1.25 lakh infants for 300 days would be between Rs. 60 and Rs. 75 lakhs. This would involve a

subsidy of about Rs. 12 to Rs. 15 lakhs to meet the additional cost of operating the scheme.

6.3 If a trust is formed for such infant milk, an adequate amount of donations can be obtained, in urban areas in particular, to operate the scheme. Donations can be sought in various areas from existing trusts, which should be approached with a proper proposition explaining the benefits which are likely to accrue to the infants in their future lives. It may not be difficult to organise such a scheme with self-generating funding. Assistance can also be obtained from international agencies and other institutions who are already in the field as has earlier been indicated.

6.4 Alternatively, the milk supply scheme should itself subsidise the special infant milk by foregoing certain overheads and costs. If the scheme is handling very large quantities of milk, the small portion of infant milk from the overall handling should be subsidised in the public interest. Since most of the milk supply schemes are in the public sector, it should be feasible to set up a special fund for this programme.

PRODUCT CONCEPT II: Nutrient cubes for infants

1. Nature of Product

A compressed cube to be added to rice and dhal just before serving it to the child is proposed. We believe that rice and dhal are the most popular and meaningful foods for children, and mothers tend to 'graduate' infants to rice and dhal, followed by other adult foods. A nutrient-rich compressed additive could hope to find acceptance.

2. Composition

Each cube will provide approximately 50 calories.

| | |
|------------------------------|---------------------|
| Groundnut flour | 12 g. (50 calories) |
| Vitamin A | 1,500 i.u. |
| Trace of Table Salt | |
| Maize starch binder | |
| Weight—Approximately 15 g. | |
| Cost—About 5 paise per cube. | |

Two cubes to be added to rice and dhal, thus providing 100 extra calories. Twice a day, it will add up to 200 supplementary calories.

3. Rationale

In Calcutta and many other rice-eating communities, after the infant has reached a certain age, rice and dhal mixtures (kichdi) are used as a first solid food. The mother is generally anxious to give a child the usual rice and dhal, which are not specially prepared for the infant but are taken out of these same materials cooked for the family. The proposed cube will significantly add calories and provide vitamin A, and the trace of salt will

make the rice and dhal a little more palatable without adversely affecting taste. It is also proposed that these cubes could be made to look interesting by adding tomato flavouring and colour. Groundnut flour cubes would otherwise look white and unappetising.

4. Packaging

We propose a month's supply of these cubes, which will cost approximately Rs. 5 per month. A smaller pack could also be introduced initially, carrying half the quantity for Rs. 2.50.

5. Target Audience

Infants from 9 months to 4 years.

6. Brand Name, Packaging and Communication-mix

To be presented during the Workshop (see Section 7.2).

7. Financial Plans

A 5-year financial plan to be presented during the Workshop (see Section 7.2).

7.2 Considerations arising from the Working Group Presentation and Report

A. General background

Guideline: To devise additional or supplementary foods to meet nutrition gaps, with cost as a serious constraint (preferably not to exceed 30 p per day), and mother appeal as a factor.

Choice of food concept: Several ideas were considered: precooked fortified rice, a seasoning powder carrying nutrients, banana fritters, cubes for mixing with food and a fortified milk, and the last two concepts were chosen as the most attractive.

B. Fortified Milk

1. *Concept:* To improve an already well-accepted food so as to fill a demonstrated nutritional gap at an acceptable price.

2. *Target group:* These would be families who have a monthly PCE of below Rs. 500 with babies 6 months to 2 years old. According to the Calcutta Survey, these babies now consume 200 ml. of milk a day, giving them 130 calories, at a cost of 44 paise. The enriched milk should provide more calories, proteins, vitamins and minerals for this same quantity and at this same cost.

3. *Source of milk:* It is envisaged that 25,000 litres from the current supply of milk in Calcutta would be set apart for this purpose. This would cover 50,000 infants every day. The cost of special milk would be Rs. 85-90 lakhs,

involving a subsidy of Rs. 10-15 lakhs per year. This could be raised from existing trusts, international agencies, philanthropic organisations or by an appeal to the affluent in the cause of the poor.

4. *The milk situation and pricing:* In October 1969, 56 million U.S. dollars were set aside for a comprehensive dairy programme entitled Operation Flood in India, whereby a milk grid would be established in the four major metropolitan cities by reconstituting skim milk powder and butter oil. These commodities would be donated to and sold by the Indian Dairy Corporation. The sales amount of Rs. 95 crores would be used to generate in the villages twice the quantity of milk which they now produce, through saving from destruction cows and calves now slaughtered in the cities when they have served their purpose. Free availability of milk would ensure that special milk at a subsidised price reached the target group of children. A brand name would then become possible, and ANNAPURNA, the goddess of nutrition, was suggested.

5. *Colour and flavour:* It would be desirable to retain the natural whiteness of milk. An almond flavour was suggested because of the nutritious and health connotation of almonds, and because such flavouring would prevent its misuse by adults in tea, coffee and other beverages.

6. *Packing:* To indicate Government sponsorship of the product, Government dairy milk type bottles

would be employed. A special mother and child design could be used to identify the bottle even to the illiterate. A daisy, similar to the PFAI symbol, would be incorporated to symbolise growth. The entire symbol could be in blue, one of the "baby-colours". To avoid technical problems in the bottling assembly line, normal size 500 ml bottles were suggested to start with. Later 200 ml bottles could also be introduced. If the project were not to be a government but a commercial operation, other dispensing alternatives could also be considered. Bottling with crown corks would enable several months' storage of the special milk. A special form of plastic-coated laminated cardboard cartons, the Tetra Pak, would enable the special milk to be stored for 15-20 days without refrigeration; this concept was being tested in Baroda. Refrigerated vending machines, operated by means of a special token, would dispense with the present milk-booth queues; the National Dairy Development Board was examining this proposition.

7. *Distribution:* Normal government milk booths in the poorer living areas could be used, and provided with appropriate banners and mock-ups. Special cards would be issued on receipt of an endorsement by the employer of the bonafide of the applicant. To cover self-employed persons, cards could also be distributed to charitable maternity hospitals, municipal inoculation centres, Government schools and hospitals, and similar other institutions.

**If your baby is
6 months to 2 years,
he needs Vitaminised
Enriched Milk
for proper
growth.**



The Government pays 20% of its cost, so no child need suffer from malnutrition.

The dangers of a poor diet.

How to make sure baby gets proper nourishment

Where to get vitaminised Milk

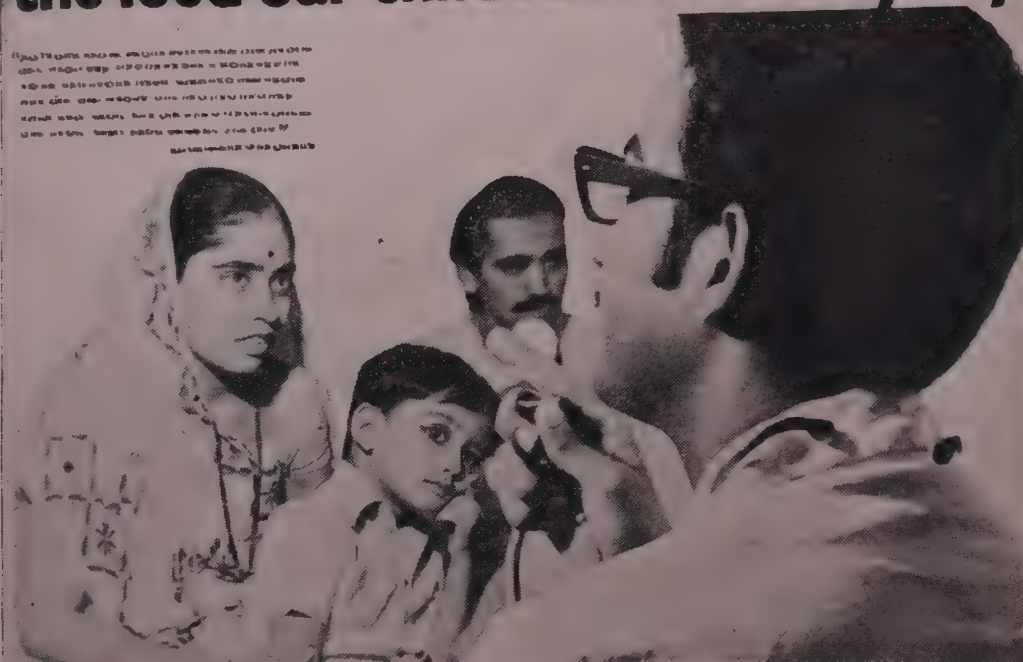


ABOUT CHILD NUTRITION AND THE GOVERNMENT'S ROLE

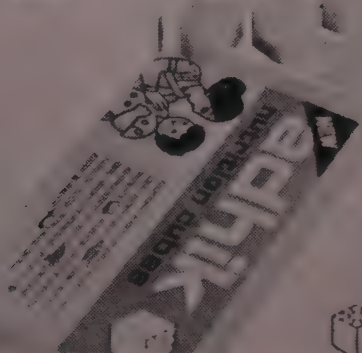
FIGURE 7

Doctors reveal alarming facts about the food our children eat every day:

Doctors reveal alarming facts about the food our children eat every day. The food we eat every day is not healthy. It is full of sugar, salt, and fat. This is bad for our children's health. We need to eat healthy food to keep our children healthy.



Now, for only 30 p.a day, fill the 'health gap' in your child's daily food with Adhik



Adhik nutrition cubes are a healthy and delicious way to give your child the nutrients they need. They are made from natural ingredients and are easy to eat. Adhik nutrition cubes are available in a variety of flavors, including fruit, vegetable, and meat. They are a great addition to your child's daily diet.



FIGURE 8

8. *Promotion*: Simple, direct communication of the unusual price, quality and promise of the milk was all that was needed (Figure 7). The three advertisements proposed would announce the product with its visual representation, to permit identification even if the advertisement could not be read. Government subsidy would feature as a subhead, to support the low price level and the high quality. The body copy would be factual and based on the existing alarming nutritional situation and the mother's anxiety for her child. The press campaign would be supported by a radio spot, film and hoardings, along with a banner and mock-up of the special bottle at the milk-booths.

C. Nutrient cubes for addition to the food given to infants

1. *Shape*: A cube shape was proposed for distinctiveness, ease of packing, ease of usage (e.g. "use just 4 cubes a day") and promotional possibilities.
2. *Cost*: For the composition earlier described in the group report (50 calories, 5/6 g protein, 50 i.u. vitamin A and 2 mg iron), the cost would work out to 30 paise for 4 cubes.
3. *Relation to other costs*: An expenditure of 30 paise would raise present food expenditure by 5% for the Rs. 20-40 PCE class, by 4% for the Rs. 40-80 PCE class and by 3% for the Rs. 60-100 PCE class. At present, in these three PCE classes, the amount in

paise per day spent on liquid milk is 6, 13 and 20; on fish/meat/egg 11.4, 21 and 29; on vegetables 11, 11 and 11 and on fruit 2, 5 and 9, respectively.

4. *Target groups*: These would be families with a PCE of Rs. 20-100, especially urban dwellers, who had a weaning child in the home.
5. *Brand name*: The name ADHIK nutrition cubes was proposed.
6. *Message strategy*: It would be necessary to prod the mother's sense of anxiety for her child by stressing the danger to her child and promising a solution in terms which she could understand. Also to reassure her that the cube adds to the goodness of the baby's present food and has a high food value in relation to cost. It was desirable to reinforce the whole message with believable medical support, perhaps in the form of an umbrella endorsement from a prestigious medical body (Figure. 8). To get reminder value, a permanent calendar with the main message of this medical body could be posted in every doctor's chamber in which patients wait.
7. *Sampling and demonstration*: These should accompany the launching of the product.
8. *Targets and financial plan*: Greater Calcutta has 12 lakh households. Of these 4 lakhs have a PCE above Rs. 500, and assuming one child in each, 10%

or 40,000 could hope to be reached. From another 8 lakh families with a PCE below Rs. 500, assuming a child in each and a 2% reach, another 16,000 are added. This gives a total target of 56,000. The 8-year financial plan might well be that in the Table (see page 108)

| | | | | | Year | | | | | | | | | |
|--------------------|-----|-----|-----|-----|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | | | | Rupees lakhs | | | | | | | | | |
| Sales | ... | ... | ... | ... | 60.00 | 66.00 | 72.00 | 80.00 | 88.00 | 105.00 | 126.00 | 151.00 | 181.00 | 217.00 |
| Cost of foods | ... | ... | ... | ... | 40.00 | 45.00 | 49.00 | 54.00 | 59.00 | 70.00 | 84.00 | 101.00 | 121.00 | 144.00 |
| Margin | | | | | 20.00 | 21.00 | 23.00 | 26.00 | 29.00 | 35.00 | 42.00 | 50.00 | 60.00 | 73.00 |
| Administration | 4% | } | | | | | | | | | | | | |
| Dealer margin | 10% | | | | 14.40 | 15.84 | 17.28 | 19.20 | 21.12 | 24.52 | 28.72 | 32.72 | 40.00 | 46.00 |
| Distributor margin | 10% | | | | | | | | | | | | | |
| Advertisement | ... | ... | ... | ... | 8.00 | 7.00 | 7.00 | 7.00 | 7.00 | 8.00 | 8.00 | 11.00 | 11.00 | 11.00 |
| Promotion | ... | ... | ... | ... | 1.00 | — | — | — | — | — | — | — | — | — |
| | | | | | 23.40 | 22.84 | 24.28 | 26.20 | 28.12 | 32.52 | 36.72 | 43.72 | 51.00 | 47.00 |
| Loss or Profit | | | | | 3.40 L | 1.84 L | 1.28 L | 0.20 L | 0.88 P | 2.48 P | 5.28 P | 6.28 P | 9.00 P | 16.00 P |

D. Some Relevant Issues in respect of Infant Foods

1. How should products like the fortified milk proposed in the group report be priced? Pricing it lower than ordinary milk with the intention of reaching the lower income groups may lead to this special product being used in lieu of ordinary milk. On the other hand, pricing it higher will exclude the low income groups as consumers. What control measures are possible?

2. If processed baby foods are to reach lower income groups also, then cost constraints on these products must be overcome.

Major factors are:

- the high cost of raw material (imported skim milk powder)
- the high cost of packaging (currently accounting for approximately 38% of the final price).

How can these constraints be overcome? What are practical

possibilities of Government intervention through excise duty relief, subsidised price of raw material, etc.?

3. What would be the pros and cons of non-branded baby-foods, manufactured with the expertise of the private sector, but promoted and distributed by Government?
4. The concept of weaning does not seem to be widely understood or correctly practised in India, since

adult foods unsuitable for infants are introduced. An additive cube has been suggested by the working group. What other types of low-cost foods could fill the need?

5. What educational measures would be effective for promotion? Does the experience in India of promoting weaning foods have any lessons for the future?
6. Mother acceptability is said to be as important as child acceptability for a baby-food. Is any information available on what constitutes such mother appeal?

7.3 Discussion on Infant Foods

Considerable discussion ensued on the *reach and potential of processed foods* in respect of the truly vulnerable groups in the low economic brackets. Given a certain income, a Calcuttan could get about 1000 calories for 12 paise by buying wheat in a ration shop. It seemed unrealistic and misleading to ask him to spend 30 paise on a processed food whose price had gone up because it had to support advertising and promotion. It was argued that for many products, fancy packaging and brand-name promotion were hardly justified, and that indeed the strategy of selling in rural areas, which constituted a large part of the country, called for a totally different orientation and priorities. It was true that one could buy natural foods of high nutritive value, such as an egg for 30 paise. Yet these were rarely complete foods, and the challenge was to supply nutrients missing in the diet in concentrated yet cheap and palatable form. Familiar natural foods were moreover always more difficult to promote than manufactured ones. For the special case of young children, it was particularly important that the form of the food should be appropriate.

The concept of a non-branded, inexpensively-packed *baby food* was mooted. Since it required no promotion, it would be cheaper in price and this would ensure it reaching lower down the economic scale. It was pointed out that experience the world over had shown that if one

does not advertise, one will not sell. Even Government and co-operative ventures, in India and elsewhere, had been obliged to advertise to improve their sales of manufactured foods even when of a fairly basic type. Likewise packaging was an important facet of sales, and this was true even in a seller's market when there was little competition between various brands.

Some queries concerned the *enriched milk product* which had been presented. Since it was as yet just a concept and not an actual product, its digestibility for children had not been studied and of course would need to be done. The low price of the enriched milk was questioned, and doubt was expressed whether a controlled delivery system to children was at all possible. It was certainly clear that *administrative problems* would be very much greater when milk was in short supply, as at present. Some suggestions had been made during the group presentation: a badam (almond) flavour to minimise misuse, and a system of special cards issued by employers, maternity hospitals, government schools and so on. It was agreed that these suggestions obviously did not exhaust the possibilities of administrative control, which was admittedly not easy. The existence of ghost ration cards in Calcutta city was well known. If no control was desired, even a higher-priced enriched milk might become necessary as a last resort, to ensure, through the operation of the market mechanism, that the right target groups were reached.

On the other hand, if milk supplies become plentiful and rationing was even rendered unnecessary, as could happen if Operation Flood became a total success, then the concept of a low-priced, subsidised milk for infants would become considerably easier to implement.

Other parallel action to ensure proper utilisation of a scarce nutritional commodity like milk was suggested. One was the *diversion of the milk* which was now used in making sweets, to be bought in turn by the affluent, for use by children. A previous abortive attempt to do so right in Calcutta city was however recalled. Even the rationing of milk, which had not so far been attempted, ought to be considered to ensure that it reached the really needy.

In regard to the product concept of *nutrient cubes*, there was a danger that the consumption of these, as of tinned baby foods, may become a status symbol resulting in an overall nutritional decline rather than improvement. It seemed desirable to so design the cubes that one or even half would provide what was required; the almost certain danger when four cubes were recommended was that less would be used. The cube shape had advantages in packing; moreover it was easier to count out cubes than measure out a powdered material. It was doubted whether a medical endorsement of a nutritional cube concept, such as had been suggested, would be forthcoming.



Chapter VIII:

Constraints in the Manufacture and Delivery of Low-Cost Nutritious Foods

8. CONCLUDING PANEL DISCUSSION

Constraints in the Manufacture and Delivery of Low Cost Nutritious Foods

Concluding discussion guided by

S. Varadarajan, Hindustan Lever, Bombay—*Session Chairman*
Santanu Chaudhuri, *Chairman*, Staples
A. K. Pal (representing R. B. Rao, *Chairman*, Snack Foods)
T. S. Nagarajan, *Chairman*, Beverages
Tarun Gupta, *Chairman*, Infant Foods

Introduction

The concluding discussions, it was pointed out, provided an opportunity for all participants, each of whom otherwise functioned in his own special environment, to take a concerted overview of the issues raised at the preceding sessions. The workshop bore the title: Nutritious Foods for Everybody. The Protein Foods Association of India had provided a platform and an opportunity. It should be clear that certain important aspects of the food problem, like producing more food, were not within the present purview. Nor was it claimed that processed foods were the only way whereby nutrition could be improved, but it was important to consider what processed foods could indeed hope to do. A few firm thoughts on general constraints and problems would benefit not only the members of the workshop, but a wide spectrum of food manufacturers, Government and the people.

Food quality

Industry did develop food products. Standards of quality for these had to be set: could this perhaps be a function of the Protein Foods Association? And who would determine such quality? Facilities for chemical analysis, and for the estimation of the levels of vitamins and minerals, were to be had in several laboratories, analytical houses and even within industry itself. As an index of protein quality, the protein efficiency ratio (PER) was generally accepted in India. Being an animal experiment, means for its determination were limited in the country, and it would be essential for a few laboratories to offer themselves for the purpose, or even for a group of industries to set up a facility. The Indian Standards Institution was in course of working out such arrangements in active association with the Protein Foods Association. In regard to the actual standards themselves for nutritious foods, minimum standards were not really desirable for quality purpose nor should it be necessary that every ingredient be specified; standards which permitted some raw material flexibility were the most helpful in practice. Standards of such design were being jointly evolved by ISI and the Central Committee for Food Standards, again with considerable stimulation from the Protein Foods Association.

It was argued that the question of standards needed to be sectorised. For subsidised foods to be used in mass feeding programmes, the mutual

supplementation effect gained by using diverse protein sources (rice plus dhal, or wheat plus oilseeds) should be employed, and the food evaluated using a protein value—cost index ratio, which encompassed quality, quantity and cost in a single figure. Protein value could be calculated from the chemical score; no laboratory determination like the PER or Net Protein Utilisation was really required, though an occasional PER determination could always be carried out as a check. In feeding programmes it was most important to get extra food to needy people; niceties of protein quality were perhaps of secondary importance. For commercial food products, whether high-cost or low-cost, it was necessary to fix standards, and to ensure vigilance. Milk extenders, for example, should not downgrade the value of milk itself. Voluntary arrangements between industry and Government to settle these standards, through the agency, if need be, of organisations like the Protein Foods Association, were probably the best solution. The Association could also give a lead, as it had indeed already done, in setting up such standards. In regard to the third category of products, which were new foods to replace existing ones in short supply, like milk, much development work was being undertaken all over the country. It was perhaps difficult at present to set firm standards for such foods till the problems that came in the way had been clearly identified. To overcome some of these, even legislation might become necessary.

Food for mass feeding programmes

In all the product concepts developed by the working groups, the cost tended to be high because of the processing and promotion involved. There was further always a suspicion of high profits by manufacturers. Could perhaps the Protein Foods Association have a role to play in setting a balance?

With its unique structure, supported by industry but playing an essentially promotional part, a strong coordinating and bringing-together role for the organisation appeared the most practical course. Faith had to be created on both sides. An agency like the Food and Nutrition Board was well suited to laying down the cost of various products offered for use in feeding programmes. Profitability for such products should obviously be viewed in a different light than was usually the practice for consumer products, which are all-too-often made for those who can afford to buy them even if they don't need them. Industry had been averse to spending on research and development of low-cost products, and devising and producing these foods had perforce become a Government responsibility.

In making the food, such factors as tastes, population groups, vulnerable segments and so on needed to be taken into account. Food habits data, such as the present, were of great value here. The responsibility should not only be that of Government; the time had come for private industry to involve itself through its own concern

for the needy. It had become evident that there was a pressing need for institutionalising the production of food for mass feeding programmes between Government and private industry. To administer it all, a non-Government, non-industry organisation was perhaps most suitable, and models for this purpose needed to be evolved, as suggested by one of the working groups.

Several manufacturers felt that restrictions and regulations on industry had become inhibitory to greater innovation and involvement. Moves to curb diversification were quoted as one example. The structuring of tax laws and food laws and Government subsidies all played their part in encouraging industry to come forward as partners. New strategies for production of low-cost prepared food materials, on an enormous scale, were called for. The most practical approach appeared to be a corporation type of structure, as described in one of the sessions, whereby a few producers could utilise their respective skills to manufacture the specified foods which were needed. To achieve this objective, Government should make available if necessary large, low-interest loans.

The matter was pressing. So far foods for feeding programmes were either totally imported, or used substantial imported components. These imports were being phased out, and Indian raw materials and technology would simply have to be found if the feeding programmes themselves were

to survive. Mass production in reasonable quality at low cost just had to be achieved.

Has this workshop itself gone any way towards a solution? It had certainly heightened a realisation of what was needed, and the problems that beset production and distribution. Further, many of the products put forward were themselves far from speculative; they could and even had been produced, and the costings, where these could be given, were not exercises in vacuum. The element of doubt lay in the reach of each processed product. Of course subsidies could be invoked, but these needed to be utilised to greatest effect. There was nothing to decry in the matter of subsidies: even an affluent country like the USA had farm subsidies for agricultural commodities as a matter of sound economic policy. Experience in India of maximising the benefits from subsidies was lacking. Could an agency be devised to handle this job effectively?

Delivery systems for nutritious foods

The Special Milk product concept was a good illustration of the delivery problem, which was to ensure that the product was not misused and reached the children for whom it was intended. Tailoring the product, as suggested at an earlier session, was one effective way since there was then no broad market. This might be true for a captive audience, but was not so easy for the many products

which were capable of being also generally marketed, like milk.

A strong plea was entered for using the existing agency of Government fair price shops for food distribution. In the rural areas of West Bengal, there were some 13,000 of these covering the entire population. Each family has a ration card, and every commodity distributed to these shops was assured of reaching the right person. The population was segmented according to individual land holding (Nil, 1-5 acres, 5-10 acres and so on). In the metropolitan areas also these fair price shops covering all families were in operation, but no classification of the population was attempted.

The price mechanism was an important means of reaching the vulnerable. Sometimes just a low price would ensure that the poorest would buy a product. A good example was wheat: just because it was cheaper, wheat consumption had tripled in recent years even in a traditional rice-eating state like Bengal. Such a view was perhaps over-optimistic for processed foods. Of course the odd exception or misuse was to be expected, and was unimportant if the major part of the system worked effectively.

Recognising fortified products

In instances where it was possible to make a product of improved nutritive value, such as fortified atta or fortified salt, with only a marginal difference in price, how could recognition of this product be achieved? One way of course was distinctive packaging, but

this was expensive. Could such packaging costs be beaten?

Perhaps a recognisable foreign item could be added, e.g. a green bead. Another possibility was to use an edible, colourless but fluorescent ingredient which could be easily recognised under illumination if it was necessary to do so.

It was pointed out that in the present atta fortification programmes, the consumer was unaware of buying a better product, since there was not even a price differential as a result of Government subsidy. The programme was not mandatory, but if it were to become compulsory, there would of course be no particular need to ensure recognition.

In the instance of salt, which is very cheap, the argument was emphatically against special packaging at increased cost. What was important was to get better salt to the people, whether they know it or not.

Tasks relating to improving nutrition in India

Food habits surveys such as the present, the holding of workshops, nutrition education and activities of a similar sort have a place in raising consciousness at all levels—Government, business, the public—in regard to nutritional shortfalls and the tasks of correcting them. Government participation and involvement had become essential in the Indian situation and should be striven for, since the implementation of solutions often lay largely in its hands.

It was therefore necessary to strengthen the work of bodies like the Protein Foods Association which had it in them to reach the Government and the public. How could this best be done? For example, the data in the present survey, and in others that are still to come, ought to reach the many others who could utilise it in productive ways. This could be implemented through summarised versions, press articles, films and so on. There were good practical reasons for doing this. For example, assuming that protein was indeed a less critical dietary deficiency in Calcutta than calories, the food gap would be easier to fill and the available protein would go further. Of course protein quality should also be taken into account, while averages were simplifications for very wide ranges of consumption which required corrective action; and if, as sometimes stated, proteins were being used as calories, there was still the resulting protein gap to be filled.

What next?

A small group could study the report in depth and prepare further documentation for the use of national planners. A presentation of the data to the Planning Commission was recommended. Additional diet surveys were called for, especially to cover the rural areas. The many products developed and ideas expressed during the workshop provided considerable food for thought and for action, and should be brought together in the form of a workshop report by the Protein Foods Association of India.



Chapter IX:

Appendices

9.1 APPENDIX I: PRODUCT POSSIBILITIES—EXERCISES BASED ON THE CALCUTTA SURVEY DATA
(by students of the Jamnalal Bajaj Institute of Management, University of Bombay)

| | PRODUCT 1 | PRODUCT 2 |
|---|---|--|
| | Product concept rationale, and unique selling proposition | |
| | A fortified chikki (groundnut-jaggery hard candy) | 50% chocolate (20% cocoa)— 50% protein (groundnut, soyabean), added vitamins A and D |
| | Acceptable to mothers and children | Chocolate a milk product, hence perceived as a health food |
| | 100 gms carry 300 calories, 25 gms protein and 2000 i.u. vitamin A | Reach of chocolates wide Better than existing chocolates |
| | Name of product | |
| | PIKKI | PRONCHO |
| | | Indicates nature and benefits Association with speed, action, fun, Mexico Can be written in all languages |
| | Target groups and markets | |
| | Income group Rs. 250-700 p.m. | All income groups, through packaging in unit combinations |
| | Initially 6-15 year olds, later adults | Primarily children below 12; youths 13-15; also others |
| | Price of product | |
| | 15 paise/50 gms | King, Re. 1.50/48 gms, triangular bar Prince, Re. 1/24 gms, triangular bar Junior, 50p/12 gms, triangular bar Mini-cube, 10p/2.5 gms, cube Priced higher than other brands to proclaim its benefits |
| | Packing | |
| | High-density polythene strip in 1 kg. and 5 kg. boxes; 50-gm retail packets | For first three, triangular cardboard cartons |
| | Profit and loss account | |
| Calcutta situation analysis common to all products: | | |
| Wide income spectrum | | |
| Calorie intake inadequate | | |
| Consequently protein not effective | | |
| Vitamin A and minerals inadequate | | |
| Existing dietary habits deeply entrenched | | |
| No aversion to packaged foods | | |
| Cooked foods have appeal | | |
| Total present processed protein-food market is Rs. 1.5 crores/year | | |

PRODUCT 1

PRODUCT 2

Communication strategy

A low-cost, healthy, natural food for children

"A mouthful of health in a protein-full bite of Proncho"

To make Pikki a synonym for a better chikki

To mothers: make children healthy, they will love you

To other groups: boy-girl approach stressing health, strength, ruggedness

Launching and marketing strategy

Jolly giant symbol

Restricted launch for 4 years in Western India which constitutes 35% of the chocolate market, and has high purchasing power and high protein awareness

National marketing in fifth year

Media and promotional strategy

Logo: Jolly giant feeding child seated on his palm

In first 4 years, film (30%), radio (15%), press (25%), hoardings (30%)

Films, leaflets, newspapers (stories of Jolly giant)

In fifth year, more press coverage (50%) and less hoardings (10%)

Point-of-purchase material

Heavy school promotion

Radio jingle (English, Hindi)

Cartoon film

Coloured face masks

Telephone dial as prop material

Dealers' contests, children's contests

Team

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Rahul Mehta, Satish Kaul,

Y. S. Kanodia, R. S. Naware,

Ashutosh Bhupatkar, Mangala

R. M. Tadvalkar

Kothe, Basab Dutta

PRODUCT 3

PRODUCT 4

PRODUCT 5

Product concept rationale, and unique selling proposition

Protein concentrate cube
60% protein, vitamins, minerals,
tomato flavour
Taste of protein masked

Powder dispersible to a milk-like
liquid
Protein 33%, carbohydrates 33%,
lactose 20%, fat 10%, minerals
and vitamins
Instant quality, vitamin and mineral
content, one-fourth milk price

Protein-rich beverage
Room for a low-priced protein food
for all
Beverage chosen for its extraneous,
health-food image
Groundnut oilcake, vitamins,
minerals, additives

Name of product

GRO
Easy to pronounce
Transcribable into all Indian languages

GOKUL
Pre-testing showed association with
milk and Lord Krishna
Understood in correct connotation,
adaptable to various media

PROGRO
An over-the-counter product

Target groups and markets

Infants 0-1½ years, children 1½-6 years
in middle and upper income groups
of very large cities

6.5 lakh families with income below
Rs. 300 p.m.
At 1 litre milk/day, comes to 16,250
kg/day of Gokul; plus 1000 kg/day
for institutional use

Children 3-15 years in families with
income of over Rs. 500 p.m.

Price of product

20 paise/5 gram cube
(protein 4.5p/5g; vitamins and
minerals 2p; fillers, flavour and
packaging 2.5p; labour and
overheads 3p)

125 g packet/Rs. 3, giving 6 paise/glass
of milk

Rs. 5.80/250 gms.

Packaging

20 cubes and 50 cubes as strips in
heat-pressed white polyethylene

2 pkts (250g) and 4 pkts (500g) per
carton, to provide 10 days and
20 days supply

Profit and loss account

In 5 years, sales of cubes to rise from
12.5 to 50 million
Loss in first 2 years, increasing profit
thereafter

Sales rising from 2½% to 22½% of
target market gives profit in the
fourth year

Sales rising from Rs. 40 to 190
lakhs in 5 years
Profit of 10% in fifth year

PRODUCT 3

Fully vegetarian

Versatility: add to dhal, or make into a hot drink

6 months test marketing (Rs. 1.25 lakhs) with evaluation of sales and housewife acceptance for promotion

Rs. 10 lakhs in the first year

Newspapers (5 national, 11 regional, one ad/month)

Magazines (5 national, 11 regional, one ad/month)

Tarit Chakraborty,

Cednic Menezes, Kishor

Kothurkar, Ashok Sanghi,

Rohit Deshpande

Dilip Shevde (Tadrock Enterprises)

PRODUCT 4

Communication strategy

Low cost

Instant quality

Protein and vitamin contents

Launching and marketing strategy

Launching by regions to promote competition and get a good share of the market

Media and promotional strategy

Geared to consumers' purse and carries concept of milk and butter

Simple audio-visual appeal

Films, radio, then newspapers

Gokul get-together evenings with magic shows, demonstrations etc.

Dealer incentive competitions

Coupons in each packet

Team

V. T. Kapur, Yogesh

Mathur, V. Shikare,

P. P. Kulkarni,

Zia Hamid,

Miss N. Chaugule

PRODUCT 5

New protein food to make child grow healthy and strong

First low-priced protein food available, half the price of others

Yet as nutritive and more tasty

6 months test-marketing through 250 0 outlets

1st year: 100 towns, 20,000 outlets

2nd year onwards: All towns over 50,000, with higher promotional budget

Press (16 newspapers/12 insertions)

Film (250 cinemas/20 weeks)

Radio (15 sec. spot twice a day for 6 months in 8 stations)

Point of purchase materials

Hoardings

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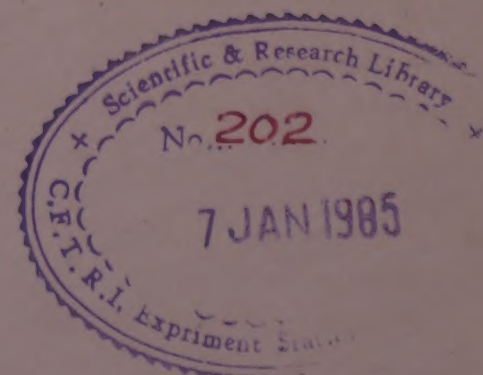
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